# PANTOLOGIA.

VOL. VII.

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A

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MR. NEWTON BOSWORTH,

OF CAMBRIDGE;

ASSISTED BY OTHER GENTLEMEN OF EMINENCE, IN DIFFERENT DEPARTMENTS OF LITERATURE.


VOL. VII.

LHW — MID.


*LONDON:*

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1813.

# PANTOLOGIA.



LHWYD, or LHUYD (Humphry), a learned antiquary, was born at Denbigh, and educated at Brazen-nose college, Oxford, where he applied to the study of physic, and practised with reputation at his native place. He died about 1570. He wrote several books, the chief of which are, 1. Commentarioli Britannicæ Descriptionis Fragmentum, 1572; a new edition of this work appeared by Moses Williams in 1731, 4to, and an English translation by Thomas Twyne in 1753, under the title of the Breviary of Britain. 2. De Monâ Druidum Insulâ, Antiquati suæ restitutâ, 1568. 3. Chronicon Walliæ, a Rege Cadwalladero, usque ad ann. dom. 1294, MS. 4. The History of Cambria, now called Wales; this was published by Dr. David Powel in 1584, 4to.

LHUYD (Edward), a Welsh antiquary, was educated at Jesus college, Oxford, where he took his degree of M. A. in 1701. He succeeded his tutor Dr. Plot as keeper of the Ashmolian museum, and applied himself with great assiduity to the searching out of the antiquities of his native country. He made very large collections, and died in 1709. He communicated many observations to bishop Gibson, and revised his edition of Camden's Britannia. He published Archæologia Britannica, giving some Account, additional to what has been hitherto published, of the Languages, Histories, and Customs, of the original Inhabitants of Great Britain, &c. vol. I. fol. Oxford, 1707. He left in MS. a Scottish or Irish-English Dictionary, and other curious proofs of his great learning and industry.

LI'ABLE. *a* (*liable*, from *lier*, old French.) Obnoxious; not exempt; subject (*Milton*).

LI'AR. *s.* (from *lie.*) One who tells falsehoods; one who wants veracity (*Shakspeare*).

LI'ARD. *a.* Mingled roan (*Markham*).

LIATRIS. In botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle naked; calyx oblong, imbricate; down feathery, coloured. Eight species; natives herbs of Virginia or Carolina.

LIBANIUS, a famous Greek rhetorician and sophist in the 4th century, was born at Antioch, and had a great share in the friendship of Julian the Apostate. That prince offered him the dignity of Præfectus Prætorio; but Libanius refused it, thinking the name of sophist, or professor of eloquence, much more honourable. There are still extant several of his letters and Greek orations, by which he acquired great reputation: but his style is somewhat affected and obscure. He was a pagan. Basil and Chrysostom were his disciples about the year 360. His letters were published at Amsterdam in 1738; his orations at Venice, 1755.

LIBANOMANTIA, in antiquity, a species of divination performed with frankincense; which, if it presently caught fire, and sent forth a grateful odour, was esteemed a happy omen, and vice versa.

LIBANUS, the name of a chain of mountains of Turkey in Asia, which lie between Proper Syria and Palestine, extending, from west to east, from the Mediterranean sea as far as Arabia. The summits of these mountains are so high, that they are always covered with snow; but below are very pleasant and fruitful valleys. They were formerly famous for the great number of cedar trees growing thereon; but now there are very few remaining. Geographers distinguish this chain into Libanus and Antilibanus; the latter of which lies on the south side of the valley, rising near the ruins of Sidon, and terminates at others in Arabia, in N. lat. 34. They are separated from each other at an equal distance throughout, and form a bason or country called by the ancients Cœlo-Syria.

LIBATION, amongst the Greeks and Romans, was an essential part of solemn sacrifices. It was also performed alone, as a drink-offering, by way of procuring the protection and favour of the gods, in the ordinary affairs of life. Libations, according to the different natures of the gods in honour of whom they were made, consisted of different liquids, but wine was the most usual. The wine offered to the gods was always unmixed with water. We meet with libations of water, libations of honey, libations

of milk, and libations of oil; these are called τηφαλια ἱερα. The libation was made with a serious deportment and solemn prayer. At sacrifices, the libation, after it had been tasted by the priest, and handed to the by-standers, was poured upon the victim. At entertainments, a little wine was generally poured out of the cup, before the liquor began to circulate, to show their gratitude to the gods for the blessings they enjoyed.

LIBAW, a sea-port town of Courland, lying on the Baltic sea, consisting entirely of wooden houses. It belongs to the duke of Courland, and is situated in lon. 21. 27 E. lat. 56. 27 N.

LIBELS, injurious reproaches or accusations written and published against the memory of one who is dead, or the reputation of one who is alive, and thereby exposing him to public hatred, contempt, and ridicule.

With regard to libels in general, there are, as in many other cases, two remedies; one by indictment or information, and the other by action. The former for a public offence; for every libel has a tendency to the breach of the peace, by provoking the person libelled to break it; which offence is said to be the same in point of law, whether the matter contained be true or false; and therefore it is that the defendant on an indictment for publishing a libel, is not allowed to allege the truth of it by way of justification. But in the remedy by action on the case, which is to repair the party in damages for the injury done him, the defendant may, as for words spoken, justify the truth of the facts, and shew that the plaintiff has received no injury at all. The chief excellence therefore of a civil action for a libel consists in this, that it not only affords a reparation for the injury sustained, but it is a full vindication of the innocence of the person traduced. 3 Black. 125.

Where a writing inveighs against mankind in general, or against a particular order of men, this is no libel; it must descend to particulars and individuals, to make it a libel. But a general reflection on the government is a libel, though no particular person is reflected on: and the writing against a known law is held to be criminal.

Though a private person or magistrate be dead at the time of making the libel, yet it is punishable, as it tends to a breach of the peace But an indictment for publishing libellous matter reflecting on the memory of a dead person, not alleging that it was done with a design to bring contempt on the family of the deceased, and to stir up the hatred of the king's subjects against them, and to excite his relations to a breach of the peace, cannot be supported; and judgment was in this case accordingly arrested.

Scandalous matter, in legal proceedings, by bill, petition, &c. in a court of justice, amounts not to a libel, if the court hath jurisdiction of the cause. But he who delivers a paper full of reflections on any person, in nature of a petition to a committee, to any other persons except the members of parliament who have to do with it, may be punished as the publisher of a libel. And by the better opinion, a person cannot justify the printing any papers which import a crime in another, to instruct counsel, &c. but it will be a libel. 2. The communication of a libel to any one person, is a publication in the eye of the law; therefore the sending an abusive private letter to a man, is as much a libel as if it were openly printed; for it equally tends to a breach of the peace.

In the making of libels, if one man dictates, and another writes a libel, both are guilty; for the writing after another shows his approbation of what is contained in the libel; and the first reducing a libel into writing may be said to be the making it, but not the composing. If one repeats, another writes, and a third approves what is written, they are all makers of the libel; because all persons who concur to an unlawful act are guilty.

It has been frequently determined, that in the trial of an indictment for a libel, the only questions for the consideration of the jury are the fact of publishing, and the truth of the inuendoes; that is, the truth of the meaning, and sense of the passages of the libel, as stated and averred in the record; whether the matter be or be not a libel, is a question of law for the consideration of the court. But the statute 32 Geo. III. c. 60, after reciting that "doubts had arisen whether on the trial of an indictment or information for the making or publishing any libel, where an issue or issues are joined between the king and the defendant, on the plea of not guilty pleaded, it be competent to the jury, impannelled to try the same, to give their verdict upon the whole matter in issue;" enacts, that "on every such trial, the jury, sworn to try the issue, may give a general verdict of guilty or not guilty, upon the whole matter put in issue, upon such indictment or information; and shall not be required or directed by the court or judge, before whom the indictment, &c. shall be tried, to find the defendant guilty, merely on the proof of the publication by such defendant, of the paper charged to be a libel, and of the sense ascribed to the same in such indictment." But it is provided by the said statute, that the court or judge shall, according to their discretion, give their opinion and directions to the jury on the matter in issue, as in other criminal cases, that the jury may also find a special verdict; and that, in case the jury shall find the defendant guilty, he may move in arrest of judgment, as by law he might have done before the passing of the act.

It has, in the case of the king, *v.* lord George Gordon, and the king, *v.* Peltier, been held that a writing tending to defame the sovereign of a foreign country is a libel punishable in England. The law was not questioned in the first case; in the second the punishment was not enforced. We think there are many serious arguments against the doctrine.

Libel, in the ecclesiastical court, is the declaration or charge drawn up in writing, on the

part of the plaintiff, to which the defendant is obliged to answer.

LIBEL, in the law of Scotland, signifies an indictment.

*To* LI'BEL. *v. n.* (from the noun.) To spread defamation, written or printed (*Donne*).

*To* LI'BEL. *v. a.* To satirize; to lampoon (*Dryden*).

LI'BELLER. *s.* (from *libel.*) A defamer by writing; a lampooner (*Dryden*).

LI'BELLOUS. *a.* (from *libel.*) Defamatory (*Wotton*).

LIBELLULA. Dragon-fly. In zoology, a genus of the class insecta, order neuroptera. Mouth armed with jaws more than two in number; lip trifid; antennas very thin, filiform, and shorter than the thorax; wings expanded; tail of the male furnished with a forked process. Fifty-six species; which may be thus subdivided.

A. Wings expanded when at rest; of which again there are two sets or sections.

α. Dorsal division of the lip very minute.

β. Divisions of the lip equal; constituting the tribe Æshna of Fabricius.

B. Wings erect when at rest: eyes distinct: outer divisions of the lip bifid. The tribe Agrion of Fabricius.

The whole genus is extremely ravenous, and generally seen hovering over stagnant waters; the larves are six-footed, active inhabitants of the water, furnished with an articulate, forcipated mouth; and prey with the most rapacious ferocity upon other larves or aquatic insects: the pupe resembles the larves, but has the rudiment of wings.

These insects are universally known, from their large size, and frequency of appearance. The organs of generation are differently situated in the male and female of this tribe: in the former, they are placed upon the under side of that part of the abdomen which lies between the inferior wings; while, in the latter, they are found at the tip or end of the abdomen.

The addresses of the libellula to his female seem carried on in a rough and intrepid, but efficacious manner. He hovers about on the wing, till the object of his amours make her appearance; he then watches an opportunity of seizing her by the head with those pincers with which his tail is armed. It is thus that the ravisher travels through the air, till the female, yielding to superior strength, perhaps to inclination, forms her body into a circle, that terminates at the genitals of the male, and thus accomplishes the great purpose of nature. It is while this kind of rapes is perpetrating, that the libellulæ are seen coupled in the air, exhibiting the form of a ring.

The female, when pregnant, retires to the side of a ditch or pond, where, by the assistance of a stick or reed, she creeps, or lowers herself down, by moving backwards, till the tip of the tail is immerged about half an inch in the water; she is then seized with a tremor of the body, during which she deposits a single egg in the water; afterwards she immerges her tail a second and a third time, when the same operations are repeated. The tail is withdrawn from the water, by contracting its annuli; and by the pressure of these upon each other, the egg is gradually forced from the ovary to the extremity of the tail, whence it is ultimately separated, by shaking that part in the water.

The eggs thus protruded by the libellula are of a white colour, and oblong form, resembling those produced by the vomitoria or common blow-fly. The form and colour of the larves are extremely disgusting: they are supposed to have gills like fishes; and beneath the head is placed an instrument excellently adapted for seizing and holding their prey. It is furnished with a forceps at the end, and can be advanced or drawn back with all the agility of the human hand.

The larve remains in the same state for nearly twelve months before it attains its full size: when the period of transformation has arrived, the worm repairs to the margin of its pond in quest of a convenient place of abode during the season of its inaction. It there attaches itself to a plant or piece of dry wood; and the skin, which has gradually become parched and brittle, at last splits opposite to the upper part of the thorax. Through this aperture the winged insect quickly pushes its way; and being thus extricated from confinement, begins to expand its wings, to flutter, and finally to launch into the air, with that gracefulness and ease peculiar to this majestic tribe.

No particular time seems appointed for the metamorphosis of the libellula into its winged state; the different species are continually emerging from the water from April to August: for as the seasons of copulation are various and frequent during the whole summer, so the larvæ or caterpillars are found of different sizes, according to their age. The smaller kinds, however, generally make their appearance before the larger; because, from breeding in shallow water, they sooner feel the influence of the sun on the approach of spring.

The manners of these insects must no doubt be greatly altered by a change, which not only confers upon them a new form but introduces them into a different element. The complete insect, in its winged state, however, still continues to pursue the same food, and remains insectivorous. The lepidopterous insects, the butterflies, and phalænæ are destined for the support of the larger libellula; which are a part of those numerous tribes appointed to confine these prolific genera within due bounds. The following are the chief species:

1. L. grandis, is the largest of this genus found in Britain, and is perhaps not inferior in bulk to any insect which this country produces: the fore part of the head is yellow; the eyes brown, and so very large, that they meet upon the top of the head. The thorax is dun coloured with four oblique bands on each side, of a lemon colour. The abdomen, which is very long, is likewise of a deep buff or rufous colour, often spotted with white and black upon the top and bottom of each segment; the small appendices which terminate the abdomen are

in this species very long; the wings have more or less of a yellow complexion, and are distinguished by a brown spot on the exterior edges. The colours of the body vanish when the insect is dead.

2. L. forcipata. Expands four inches and an half. Nose yellow, with a black line on the prominent part; thorax black, with several broad yellow stripes, two on the front, and two behind the ligaments of each pair of wings; abdomen black, with two streaks resembling a crescent on each segment; wings transparent, and white, with a slight tinge of amber; tail with three incurved claws.

3. L. puella. Body green and azure; wings adorned towards the middle each with a large spot, of a deep blue, inclining to black. Feet black; wings immaculate on their exterior margin. From the brilliancy and richness of its colours, it has been called the king's fisher; it frequents little rivulets of water, overshaded with bushes. There are many varieties of this species, from difference of spots or colours.

4. L. virgo. Wings coloured in a variety of ways, and hence producing many varieties of the species; the body is generally silky, and greenish, or blueish-green; wings blueish, or blueish-green, sometimes with dots, and sometimes gilt at the margin. Inhabits our own country, and Europe in general, and is very common about waters. See Nat. Hist. Pl. CLII.

LIBENTINA, a sirname of Venus. She had a temple at Rome, where the young women used to dedicate the toys and childish amusements of their youth, when arrived at nubile years. (*Varro.*)

LIBER, a sirname of Bacchus, which signifies free. He received this name from his delivering some cities of Bœotia from slavery, or because wine, of which he was the patron, delivered mankind from their cares.

Liber. In botany. (According to Scaliger, *quasi luber, quia de arbore reluatur, resolvatur*, or to use Cato's word *glubatur*. As from *cresco* comes *creber*; from *facio, faber*; from *suo, suber*; so from *luo* comes *luber*, and thence *liber*. But a more probable derivation is from the Æolic λεπορ for λεπες, which by changing π into ϐ became λεϐηρις.) Tegmentum tertium membranaceum succidum flexile. The inner bark of a vegetable; or the third integument, membranaceous, juicy and flexible. The wood is gradually formed from this; and according to Linnéus, the corol is a continuation of it.

LI'BERAL. *a.* (*liberalis*, Latin.) 1. Not mean; not low in birth. 2. Becoming a gentleman. 3. Munificent; generous; bountiful (*Milton*).

Liberal arts, are such as depend more on the labour of the mind than on that of the hands: or, that consist more in speculation than operation; and have a greater regard to amusement and curiosity than to necessity. The word comes from the Latin *liberalis*, which among the Romans signified a person who was not a slave; and whose will, of consequence, was not checked by the command of any master. Such are grammar, rhetoric, painting, sculpture, architecture, music, &c. The liberal arts used formerly to be summed up in the following Latin verse: "Lingua, Tropus, Ratio, Numerus, Tonus, Angulus, Astra." And the mechanical arts, which, however, are innumerable, under this: "Rus, Nemus, Arma, Faber, Vulnera, Lana, Rates." See Arts.

LIBERALIA, festivals yearly celebrated in honour of Bacchus the 17th of March, at Rome. Slaves were permitted to speak with freedom. They are much the same as the Dionysia of the Greeks.

LIBERA'LITY. *s.* (*liberalitas*, Lat. *liberalité*, Fr.) Munificence; bounty; generosity; generous profusion (*Shakspeare*).

LI'BERALLY. *ad.* (from *liberal.*) 1. Bounteously; bountifully; largely (*James*). 2. Not meanly; magnanimously.

LIBERTAS, a goddess of Rome, who had a temple on mount Aventine, raised by T. Gracchus. She was represented as a woman in a light dress, holding a rod in one hand and a cap in the other, both signs of independence, as the former was used by the magistrates in the manumission of slaves, and the latter was worn by slaves who were soon to be set at liberty.

LI'BERTINE. *s.* (*libertin*, French.) 1. One unconfined; one at liberty (*Shakspeare*). 2. One who lives without restraint or law (*Rowe*). 3. One who pays no regard to the precepts of religion (*Shakspeare. Collier*). 4. (In law; *libertinus*, Lat.) A freedman; or rather, the son of a freedman (*Ayliffe*).

Libertines, Libertini, in ecclesiastical history, a religious sect, which rose in the year 1525, whose principal tenets were, that the Deity was the sole operating cause in the mind of man, and the immediate author of all human actions; that, consequently, the distinctions of good and evil, which had been established with regard to those actions, were false and groundless, and that men could not, properly speaking, commit sin; that religion consisted in the union of the spirit or rational soul with the Supreme Being; that all those who had attained this happy union, by sublime contemplation and elevation of mind, were then allowed to indulge, without exception or restraint, their appetites or passions; that all their actions and pursuits were then perfectly innocent; and that, after the death of the body, they were to be united to the Deity. They likewise said that Jesus Christ was nothing but a mere *je ne scai quoi*, composed of the spirit of God, and of the opinion of men. These maxims occasioned their being called Libertines; and the word has been used in an ill sense ever since.

The Libertini spread principally in Holland and Brabant. Their leaders were one Quintin, a Picard, Pockesius, Ruffus, and another called Chopin, who joined with Quintin, and became his disciple.

Libertines of Geneva, were a cabal of rakes rather than of fanatics; for they made no pretences to any religious system, but

pleaded only for the liberty of leading voluptuous and immoral lives. This cabal was composedof a certain number of licentious citizens, who could not bear the severe disipline of Calvin, who punished with rigour not only dissolute manners, but also whatever bore the aspect of irreligion and impiety.

LI'BERTINE. *a.* (*libertin*, Fr.) Licentious; irreligious (*Swift*).

LI'BERTINISM. *s.* (from *libertine.*) Irreligion; licentiousness of opinions and practice (*Atterbury*).

LI'BERTY. *s.* (*liberté*, French; *libertas*, Latin.) 1. Freedom, as opposed to slavery (*Addison*). 2. Exemption from tyranny or inordinate government (*Milton*). 3. Freedom, as opposed to necessity (*Locke*). 4. Privilege; exemption; immunity (*Davies*). 5. Relaxation of restraint (*Milton*). 6. Leave; permission (*Locke*).

LIBERTY, denotes a state of freedom, in contradistinction to slavery or restraint; and may be considered as either natural or civil. The absolute rights of man, considered as a free agent, endowed with discernment to know good from evil, and with power of choosing those measures which appear to him to be most desirable, are usually summed up in one general appellation, and denominated the natural liberty of mankind. This natural liberty consists properly in a power of acting as one thinks fit, without any restraint or controul, unless by the law of nature; being a right inherent in us by birth, and one of the gifts of God to man at his creation, when he endued him with the faculty of free-will. But every man, when he enters into society, gives up a part of his natural liberty, as the price of so valuable a purchase; and, in consideration of receiving the advantages of mutual commerce, obliges himself to conform to those laws which the community has thought proper to establish. And this species of legal obedience and conformity is infinitely more desirable than that wild and savage liberty which is sacrificed to obtain it. For no man, that considers a moment, would wish to retain the absolute and uncontrouled power of doing whatever he pleases: the consequence of which is, that every other man would also have the same power; and then there would be no security to individuals in any of the enjoyments of life.

Political or civil liberty, therefore, which is that of a member of society, is no other than natural liberty, so far restrained by human laws, and no further, as is necessary and expedient for the general advantage of the public.

Hence we may collect that the law, which restrains a man from doing mischief to his fellow-citizens, though it diminishes the natural, increases the civil liberty of mankind: but that every wanton and causeless restraint of the will of the subject, whether practised by a monarch, by nobility, or a popular assembly, is a degree of tyranny; nay, that even laws themselves, whether made with or without our consent, if they regulate and constrain our conduct in matters of mere indifference without any good end in view, are regulations destructive of liberty; whereas, if any public advantage can arise from observing such precepts, the controul of our private inclinations in one or two particular points will conduce to preserve our general freedom in others of more importance, by supporting that state of society which alone can secure our independence. So that laws, when prudently framed, are by no means subversive, but rather introductive of liberty; for where there is no law, there is no freedom.

But then, on the other hand, that constitution or form of government is alone calculated to maintain civil liberty, which leaves the subject entire master of his own conduct, except in those points wherein the public good requires some direction or restraint.

The above definition of the learned commentator is admitted by his last editor to be clear, distinct, and rational, as far as relates to civil liberty; in the definition of which, however, he adds, it ought to be understood, or rather expressed, that the restraints introduced by the law should be equal to all; or as much so as the nature of things will admit.

Political liberty is distinguished by Mr. Christian from civil liberty, and he defines it to be the security with which from the constitution, form, and nature of the established government, the subjects enjoy civil liberty. No ideas, continues he, are more distinct than those of civil and political liberty; yet they are generally confounded; and the latter cannot yet claim an appropriate name. The learned judge (Blackstone) uses political and civil liberty indiscriminately; but it would perhaps be convenient uniformly to use those terms in the respective senses here suggested, or to have some fixed specific denominations for ideas which in their natures are so widely different. The last species of liberty has most engaged the attention of mankind, and particularly of the people of England.

The people of England have a firm reliance that this civil liberty is secured to them under the constitution of the government.

First. By the great charter of liberties, which was obtained, sword in hand, from king John; and afterwards with some alterations, confirmed in parliament by king Henry III. his son; which charter contained very few new grants; but as Sir Edward Coke observes, was for the most part declaratory of the principal grounds of the fundamental laws of England. Afterwards by the statute called confirmatio cartarum, 25 Edward I. whereby the great charter is directed to be allowed as the common law: all judgments contrary to it are declared void; copies of it are ordered to be sent to all the cathedral churches, and read twice a year to the people; and sentence of excommunication is directed to be as constantly denounced against all those who by word, deed, or counsel, act contrary thereto, or in any degree infringe it. Next, by a multitude of subsequent corroborating statutes from Edward I. to Henry IV.; of which the following are the most forcible.

Statute 25 Edward III. statute 5, c. 4. None shall be taken by petition or suggestion made to the king or his council, unless it be by indictment of lawful people of the neighbourhood, or by process made by writ original at the common law. And none shall be put out of his franchises or freehold, unless he be duly brought to answer, and fore-judged by course of law; and if any thing be done to the contrary, it shall be redressed and holden for none.

Statute 42 Edward III. c. 3. No man shall be put to answer without presentment before justices, or matter of record of due process, or writ

original, according to the ancient law of the land. And if any thing be done to the contrary, it shall be void in law, and held for error. After a long interval these liberties were still further confirmed by the petition of right; which was a parliamentary declaration of the liberties of the people, assented to by king Charles I. in the beginning of his reign. This was closely followed by the still more ample concessions made by that unhappy prince to his parliament, (particularly the dissolution of the star chamber, by statute 16 Charles I. c. 10.) before the fatal rupture between them; and by the many salutary laws, particularly the habeas corpus act, passed under king Charles II.

To these succeeded the bill of rights, or declaration delivered by the lords and commons to the prince and princess of Orange, February 13, 1688; and afterwards enacted in parliament, when they became king and queen; which, as peculiarly interesting, is here inserted at length.

Statute 1 William and Mary, statute 2, c. 2, § 1. Whereas the lords spiritual and temporal, and commons assembled at Westminster, representing all the estates of the people of this realm, did upon the 13th of February 1688, present unto their majesties, then prince and princess of Orange, a declaration containing that, the said lords spiritual and temporal, and commons, being assembled in a full and free representative of this nation, for the vindicating their ancient rights and liberties; declare, that the pretended power of suspending of laws, or the execution of laws, by regal authority, as it hath been assumed and exercised of late, is illegal; that the pretended power of dispensing with laws, or the execution of laws, by regal authority, as it hath been assumed and exercised of late, is illegal; that the commission for erecting the late court of commissioners for ecclesiastical causes, and all other commissions and courts of like nature, are illegal and pernicious.

That levying money for, or to the use of the crown, by pretence of prerogative, without grant of parliament, for longer time, or in other manner than the same is or shall be granted, is illegal; that it is the right of the subjects to petition the king, and all commitments and prosecutions for such petitioning, are illegal; that the raising or keeping a standing army within the kingdom in time of peace, unless it be with consent of parliament, is against law; that the subjects which are protestants may have arms for their defence, suitable to their conditions, and as allowed by law; that election of members of parliament ought to be free; that the freedom of speech, and debates or proceedings in parliament ought not to be impeached or questioned in any court or place out of parliament; that excessive bail ought not to be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted; that jurors ought to be duly impannelled and returned, and jurors which pass upon men in trials for high treason ought to be freeholders; that all grants and promises of fines and forfeitures of particular persons before conviction are illegal and void; and for redress of all grievances, and for the amending, strengthening, and preserving of the laws, parliaments ought to be held frequently; and they do claim, demand, and insist upon all and singular the premises, as their undoubted rights and liberties; and that no declarations, judgments, doings, or proceedings, to the prejudice of the people in any of the said premises, ought in any-wise to be drawn hereafter into consequence or example. Sect. 6. All and singular the rights and liberties asserted and claimed in the said declaration are the true, ancient, and indubitable rights and liberties of the people of this kingdom, and so shall be esteemed, allowed, adjudged, and taken to be; and all the particulars aforesaid shall be firmly holden as they are expressed in the said declaration; and all officers shall serve their majesties according to the same in all times to come. Sect. 12. No dispensation by *non obstante* of any statute shall be allowed, except a dispensation be allowed of in such statute; and except in such cases as shall be especially provided for during session of parliament. Sect. 13. No charter granted before the 23d of October, 1689, shall be invalidated by this act, but shall remain of the same force as if this act had never been made. Lastly, these liberties were again asserted at the commencement of the last century, in the act of settlement, statute 12 and 13 William III. c. 2, whereby the crown was limited to his present majesty's illustrious house; and some new provisions were added at the same fortunate æra, for better securing our religion, laws, and liberties, which the statute declares to be "the birthright of the people of England;" according to the ancient doctrine of the common law.

Thus much for the declaration of our rights and liberties. The rights themselves, thus defined by these several statutes, consist in a number of private immunities, which will appear from what has been premised, to be indeed no other than either that residuum of natural liberty, which is not required by the laws of society to be sacrificed to public convenience; or else those civil privileges which society hath engaged to provide in lieu of the natural liberties so given up by individuals. These, therefore, were formerly, either by inheritance or purchase, the rights of all mankind; but in most other countries of the world, being now more or less debased or destroyed, they at present may be said to remain, in a peculiar and emphatical manner, the rights of the people of England.

These rights may be reduced to three principal or primary articles:

The right of personal security. The right of personal liberty. The right of private property.

The right of personal security consists in a person's legal and uninterrupted enjoyment of his life, his limbs, his body, his health, and his reputation. The enjoyment of this right is secured to every subject by the various laws made for the punishment of those injuries, by which it is any way violated; for a particular detail of which, see ASSAULT, HOMICIDE, MAIHEM, LIBEL, NUISANCE, &c.

The words of the great charter, c. 29, are, "Nullus liber homo capiatur, imprisonetur, vel aliquo modo destruatur, nisi per legale judicium parium suorum aut per legem terræ." No freeman shall be taken, imprisoned, or any way destroyed, unless by the lawful judgment of his peers, or by the law of the land; which words, "aliquo modo destrautur," according to Coke, include a prohibition not only of killing or maiming, but also of torturing (to which our laws are strangers), and of every oppression by colour of an illegal authority. And it is enacted by stat. 5 Edward III. c. 9, that no man shall be attached by any accusation, nor forejudged of life or limb, nor shall his lands or goods be seized

into the king's hands contrary to the great charter, and the law of the land. And again, by statute 28 Edward III. c. 3. that no man shall be put to death without being brought to answer by due process of law.

The right of personal liberty consists in the power of loco-motion, of changing situation, or moving one's person to whatsoever place one's own inclination may direct, without imprisonment or restraint, unless by due course of law. This right there is at present no occasion to enlarge upon. For the provisions made by the laws of England to secure it, see HABEAS CORPUS, BAIL, ARREST, &c.

The absolute right of property, inherent in every Englishman, consists in the free use, enjoyment, and disposal of all his acquisitions, without any controul or diminution, save only by the laws of the land.

Another effect of this right of private property is, that no subject of England can be constrained to pay any aids or taxes, even for the defence of the realm, or the support of the government, but such as are imposed by his own consent, or that of his representatives in parliament. By statute 25 Edward I. c. 5, 6, it is provided, that the king shall not take any aids or tasks, but by the common consent of the realm. And what that common consent is, is more fully explained by statute 34 Edward I. statute 4, c. 1; which enacts, that no talliage or aid shall be taken without the assent of the archbishops, bishops, earls, barons, knights, burgesses, and other freemen of the land; and again, by statute 14 Edw. III. statute 2. c. 1. the prelates, earls, barons, and commons, citizens, burgesses, and merchants, shall not be charged to make any aid, if it be not by the common assent of the great men and commons in parliament. And as this fundamental law had been shamefully evaded under many preceding princes, by compulsive loans and benevolences, extorted without a real and voluntary consent, it was made an article in the petition of rights, 3 Charles I. that no man shall be compelled to yield any gift, loan, or benovolence, tax, or such like charge, without common consent by act of parliament. And, lastly, by the bill of rights, statute 1 William and Mary, statute 2, c. 2, it is declared, that levying money for or to the use of the crown by pretence of prerogative, without grant of parliament, or for longer time, or in other manner than the same is or shall be granted, is illegal.

The above is a short view of the principal absolute rights which appertain to every Englishman, and the constitution has provided for the security of their actual enjoyment, by establishing certain other auxiliary subordinate rights, which serve principally as out-works or barriers, to protect and maintain those principal rights inviolate. These are,

The constisution, powers, and privileges of parliament. The limitation of the king's prerogative. The right of applying to courts of justice for redress of injuries. The right of petitioning the king or parliament. The right of having arms for defence.

This last auxiliary right of the subjects of having arms for their defence, suitable to their condition and degree, and such as are allowed by law, is declared by the bill of rights; and it is, indeed, a public allowance, under due restrictions of the natural right of resistance and self-preservation, when the sanctions of society and laws are found insufficient to restrain the violence of oppression.

As to the first and second of the subordinate rights above mentioned, see PARLIAMENT, KING.

With respect to the third and fourth, some short information is here subjoined.

Since the law is, in England, the supreme arbiter of every man's life, liberty, and property, courts of justice must at all times be open to the subject, and the law be duly administered therein. The emphatical words of Magna Charta, c. 29, spoken in the person of the king, who, in judgment of law, (says Sir Edward Coke) is ever present, and repeating them in all his courts, are these, "Nulli vendemus, nulli negabimus, aut differemus rectum vel justitiam." To none will we sell, to none will we deny, or delay, right or justice.

It is also ordained by Magna Charta, c. 29, that no freeman shall be outlawed, that is, put out of the protection and benefit of the law, but by the laws of the land. By statutes 2 Edward III. c. 8. 11 Richard II. c. 10, it is enacted, that no commands or letters shall be sent under the great seal, or the little seal, the signet or privy seal, in disturbance of the law; or to disturb or delay common right; and though such commandments should come, the judges shall not cease to do right. This is also made a part of their oath, by statute 11 Edward III. stat. 4. And by the bill of rights it is declared, that the pretended power of suspending or dispensing with laws, or the execution of laws, by regal authority, without consent of parliament, is illegal. Not only the substantial part, or judicial decisions of the law, but also the formal part, or method of proceeding, cannot be altered but by parliament; for, if once those outworks were demolished, there would be an inlet to all manner of innovation in the body of the law itself. The king, it is true, may erect new courts of justice; but then they must proceed according to the old established forms of the common law. For which reason it is declared in the statute 16 Charles I. c. 10, upon the dissolution of the court of star-chamber, that neither his majesty nor his privy council have any jurisdiction, power, or authority, by English bill, petition, articles, or libel, (which were the course of proceeding in the star-chamber borrowed from the civil law), or by any other arbitrary way whatsoever, to examine or draw into question, determine or dispose of the lands or goods of any subject of this kingdom; but that the same ought to be tried and determined in the ordinary courts of justice, and by course of law.

The right of petitioning the king, or either house of parliament, for the redress of grievances, appertains to every individual in cases of any uncommon injury, or infringement of the rights already particularized, which the ordinary course of law is too defective to reach. The restrictions, for some there are, which are laid upon this right of petitioning in England, while they promote the spirit of peace, are no check upon that of liberty; care only must be taken, lest, under the pretence of petitioning, the subject be guilty of any riot or tumult; as happened in the opening of the memorable parliament in 1640. And to prevent this, it is provided by statute, 13 Charles II. stat. 1. c. 5, that no petition to the king, or either house of parliament, for any alteration in church or state, shall be signed by above twenty persons,

unless the matter thereof be approved by three justices of the peace; or the major part of the grand jury in the county; and in London by the lord mayor, aldermen, and common council: nor shall any petition be presented by more than ten persons at a time. But under these regulations, it is declared by the bill of rights, that the subject hath a right to petition; and that all commitments and prosecutions for such petitioning are illegal. The sanction of the grand jury may be given either at the assizes or at the quarter sessions; the punishment for offending against the statute 13 Charles II. not to exceed a fine of £100, and three months' imprisonment.

In these several articles consist the rights, or, as they are frequently termed, the liberties of Britons: liberties more generally talked of, than thoroughly understood; and yet highly necessary to be perfectly known and considered by every man of rank or property, lest his ignorance of the points whereon they are founded should hurry him into faction and licentiousness on the one hand, or a pusillanimous indifference and criminal submission on the other. And we have seen that these rights consist, primarily, in the free enjoyment of personal security, of personal liberty, and of private property. So long as these remain inviolable, the subject is perfectly free; for every species of compulsive tyranny and oppression must act in opposition to one or other of these rights, having no other object upon which it can possibly be employed. To preserve these from violation, it is necessary that the constitution of parliaments be supported in its full vigour; and limits, certainly known, be set to the royal prerogative. And, lastly, to vindicate these rights when actually violated or attacked, the subjects of Britain are entitled, in the first place, to the regular administration and free course of justice in the courts of law; next, to the right of petitioning the king and parliament for redress of grievances; and, lastly, to the right of having and using arms for self-preservation and defence. And all these rights and liberties it is our birth-right to enjoy entire.

This review of our situation may fully justify the observation of a learned French author, who indeed generally both thought and wrote in a spirit of genuine freedom; and who did not scrupled to profess, even in the very bosom of his native country, that the British is the only nation in the world where political or civil liberty is the direct end of its constitution. Recommending therefore to the student in our laws a farther and more accurate search into this extensive and important title, we shall close our remarks upon it with the expiring wish of the famous father Paul to his country, "Esto perpetua!"

Liberty and necessity. See Necessity.

LIBETHRA, a mountain of Magnesia, or Bœotia, according to some, sacred to the muses, who from thence are called Libethrides. (*Vir. Plin.* &c.)

LIBI'DINOUS. *a.* (*libidinosus*, Lat.) Lewd; lustful (*Bentley*).

LIBI'DINOUSLY. *ad.* Lewdly; lustfully.

LIBITINA, a goddess at Rome, who presided over funerals. According to some she is the same as Venus, or rather Proserpine. Servius Tullus first raised her a temple at Rome, where every thing necessary for funerals was exposed to sale. (*Dionys. Liv.* &c.)

LIBON, a Greek architect who built the famous temple of Jupiter Olympus. He flourished about 450 years before the christian æra.

LIBOURNE, a town of France, and principal place of a district, in the department of the Gironde, containing about 5000 inhabitants: five posts E. of Bourdeaux. Lon. 17. 25 E. Ferro. Lat. 44. 55 N.

LIBRA, in astronomy, is one of the twelve signs of the zodiac; exactly opposite to Aries; so called, because when the sun is in this sign, at the autumnal equinox, the days and nights are equal, as if weighed in a balance.

The stars in this constellation according to Ptolemy are seventeen, Tycho ten, Hevelius twenty, and Flamstead fifty four, viz. 0. 2 3. 3. 10. 6. 30.

Libra also denotes the ancient Roman pound, borrowed from the Sicilians, who called it litra, λιτρα.

The libra was divided into twelve unciæ, or ounces, and the ounce into twenty-four scruples.

The divisions of the libra were, the *uncia*, one twelfth; the *sextans*, one sixth; the *quadrans*, one fourth; the *triens*, one third; the *quincunx*, five ounces; the *semis*, six; the *septunx*, seven; the *bes*, eight; the *dodrans*, nine; the *dextans*, ten; the *deunx*, eleven; lastly, the *as* weighed twelve ounces, or one libra.

The Roman libra was used in France for the proportions of their coin till the time of Charlemagne, or perhaps till that of Philip I. in 1093, their sols being so proportioned, as that 20 of them were equal to the libra. By degrees it became a term of account; and every thing of the value of twenty sols was called a *livre*.

Libra pensa, in our law-books, denotes a pound of money in weight. It was usual in former days not only to count the money but to weigh it: because many cities, lords, and bishops, having their mints, coined money, and often very bad too; for which reason, though the pound consisted of 20 shillings, they always weighed it.

LI'BRAL. *a.* (*libralis*, Latin.) Of a pound weight.

LIBRA'RIAN. *s.* (*librarius*, Lat.) 1. One who has the care of a library. 2. One who transcribes books (*Broome*).

LI'BRARY. *s.* (*libraire*, French.) A large collection of books (*Dryden*).

Library, an edifice or apartment destined for holding a considerable number of books placed regularly on shelves, or the books themselves lodged in it. Some authors refer the origin of libraries to the Hebrews; and observe, that the care these took for the preservation of their sacred books, and the memory of what concerned the actions of their ancestors, became an example to other nations, particularly to the Egyptians. Osmanduas, king of Egypt, is said to have taken the hint first; who, according to Diodorus, had a library built in his palace, with this inscription over the door,

ΨΥΧΗΣ ΙΑΤΡΕΙΟΝ. Nor were the Ptolemies, who reigned in the same country, less curious and magnificent in books.

The scripture also speaks of a library of the kings of Persia, Ezra v. 17. vi. 1. which some imagine to have consisted of the historians of that nation, and of memoirs of the affairs of state; but, in effect, it appears rather to have been a repository of laws, charters, and ordinances of the kings. The Hebrew text calls it the house of treasures, and afterwards the house of the rolls, where the treasures were laid up. We may, with more justice, call that a library, mentioned in the second of Esdras to have been built by Nehemiah, and in which were preserved the books of the prophets, and of David, and the letters of their kings.

The first who erected at library at Athens was the tyrant Pisistratus: and yet Strabo refers the honour of it to Aristotle. That of Pisistratus was transported by Xerxes into Persia, and was afterwards brought back by Seleucus Nicanor to Athens. Long after, it was plundered by Sylla, and re-established by Hadrian. Plutarch says, that under Eumenes there was a library at Pergamus, containing 200,000 books. Tyrannian, a celebrated grammarian, contemporary with Pompey, had a library of 30,000 volumes. That of Ptolemy Philadelphus, according to A. Gellius, contained 700,000, all in rolls, burnt by Cæsar's soldiers.

Constantine, and his successors, erected a magnificent one at Constantinople; which in the eighth century contained 300,000 volumes, all burnt by order of Leo Isaurus; and, among the rest, one wherein the Iliad and Odyssey were written in letters of gold, on the guts of a serpent.

The most celebrated libraries of ancient Rome, were the Ulpian, and the Palatine. They also boast much of the libraries of Paulus Æmilius, who conquered Perseus; of Lucilius Lucullus, of Asinius Pollio, Atticus, Julius Severus, Domitius Serenus, Pamphilius Martyr, and the emperors Gordian and Trajan.

Anciently, every large church had its library; as appears by the writings of St. Jerome, Anastasius, and others. Pope Nicholas laid the first foundation of that of the Vatican, in 1450.

The Bodleian library at Oxford, built on the foundation of that of duke Humphry, exceeds that of any university in Europe, and even those of all the sovereigns of Europe, except the emperor's and the late French king's, which are each of them older by a hundred years. It was first opened in 1602, and has since found a great number of benefactors; particularly sir Robert Cotton, sir H. Savil, archbishop Laud, sir Kenelm Digby, Mr. Allen, Dr. Pococke, Mr. Selden, and others. The Vatican, the Medicean, that of Bessarion at Venice, and those just mentioned, exceed the Bodleian in Greek manuscripts; which yet outdoes them all in Oriental manuscripts.

As to printed books, the Ambrosian at Milan, and that of Wolfenbuttle, are two of the most famous, and yet both inferior to the Bodleian.

Library (King's), at St. James's, was founded by Henry, eldest son of James I. and made up partly of books, and partly of manuscripts, with many other curiosities for the advancement of learning. It has received many additions from the libraries of Isaac Casaubon and others.

Library (Cottonian), originally consisted of 958 volumes of original charters, grants, instruments, letters of sovereign princes, transactions between this and other kingdoms and states, genealogies, histories, registers of monasteries, remains of Saxon laws, the book of Genesis, thought to be the most ancient Greek copy extant, and said to have been written by Origen in the second century, and the curious Alexandrian copy or manuscript in Greek capitals. This library is kept in the British Museum, with the large valuable library of Sir Hans Sloane, amounting to upwards of 42,000 volumes, &c. There are many public libraries belonging to the several colleges at Oxford and Cambridge, and the universities of North Britain. The principal public libraries in London, beside that of the Museum, are those of the College of Heralds, of the College of Physicians, of Doctors Commons, to which every bishop at the time of his consecration gives at least 20l. sometimes 50l. for the purchase of books; those of Gray's Inn, Lincoln's Inn, Inner Temple, and Middle Temple; that of Lambeth, founded by archbishop Bancroft, in 1610, for the use of succeeding archbishops of Canterbury, and increased by the benefactions of archbishops Abbot, Sheldon, and Tennison, and said to consist of at least 15,000 printed books, and 617 volumes in manuscript; that of Red-cross street, founded by Dr. Daniel Williams, a presbyterian divine, and since enriched by many private benefactions; that of the Royal Society, called the Arundelian or Norfolk library, because the principal part of the collection formerly belonged to the family of Arundel, and was given to the society by Henry Howard, afterwards duke of Norfolk, in 1666, which library has been increased by the valuable collection of Francis Aston, Esq. in 1715, and is continually increasing by the numerous benefactions of the works of its learned members, and others: that of St. Paul's of Sion college; the Queen's library, erected by queen Caroline in 1737; and the Surgeons' library, formerly kept in their hall in the Old Bailey, &c.

*To* LI'BRATE. *v. n.* (*libro*, Lat.) To poise; to balance; to hold in equipoise.

LIBRA'TION. *s.* (*libratio*, Lat.) 1. The state of being balanced (*Thomson*).

Libration. In astronomy, an apparent irregularity in the motion of the moon, by which she seems to librate, or waver about her own axis; sometimes from the east to the west, and sometimes from the west to the east. See Moon.

Hence it is, that some parts in the moon's western limb, or margin, at one time, recede from the centre of the disc, and at another, move towards it; by which means, some of

those parts, which were before visible, set and hide themselves in the invisible side of the moon, and afterwards become again conspicuous.

As the spots on the moon do not appear to undergo any sensible changes in their respective positions, and as they are ordinarily seen again of the same magnitude and under the same form, when they have returned to the same position on the lunar disc, it has been concluded that they are fixed upon the real surface of that luminary. Their oscillations, therefore, seem to indicate a sort of balancing in the lunar globe, to which has been given the name of libration, from a Latin word signifying to balance.

But in adopting this expression, although it well depicts the appearances observed, it must not have a positive sense given to it; for the phænomenon itself has nothing of reality: it is only a compound result of several optical illusions. To comprehend and separate these, let us resort to some fixed terms. Conceive that a visual ray is drawn from the centre of the earth to the centre of the moon: the plane drawn through the latter centre perpendicularly to this ray will cut the lunar globe according to the circumference of a circle which is, with respect to us, the apparent disc. If the moon had no real rotatory motion, its motion of revolution solely would discover to us all the points of its surface in succession: the visual ray would therefore meet that surface successively in different points, which to us would appear to pass, the one after the other, to the apparent centre of the lunar disc. The real rotatory motion counteracts the effects of this apparent rotation, and brings back constantly towards us the same face of the lunar globe: whence may be seen the reason why the opposite face is never revealed to us.

Suppose, now, that the rotation of the moon is sensibly uniform, that is to say, that it does not partake of any periodical inequalities (this supposition is at least the most natural which we can make, and it is conformable to observations): then one of the causes which produce the libration will become evident; for the motion of revolution partaking of the periodical inequalities, is sometimes slower, sometimes more rapid: the apparent rotation which it occasions cannot, therefore, always exactly counterbalance the actual rotation, which remains constantly the same; and these two effects will surpass each other by turns. The points of the lunar globe ought, therefore, to appear turning sometimes in one direction, sometimes in another, about its centre; and the resulting appearance is the same as if the moon had a little vibratory balancing from one side to the other of the radius vector drawn from its centre to the earth. It is this which is named the libration in longitude.

Several accessory but sensible causes modify this first result. The spots of the moon do not always retain the same elevation above the plane of its orbit, indeed some of them, by the effect of the rotation, pass from one side of this plane to the opposite side. These circumstances indicate an axis of rotation which is not exactly perpendicular to the plane of the lunar orbit, but according as this axis presents to us its greater or its smaller obliquity, it must discover to us successively the two poles of rotation of the lunar spheroid: hence we come to perceive, at certain times, some of the points situated towards these poles, and lose the sight of them afterwards, when they arrive nearer the apparent edge: this is called the libration in longitude. It is but inconsiderable, and, therefore, indicates that the equator of the moon differs very little in position from the plane of its orbit.

Finally, a third illusion arises from the observer being placed at the surface of the earth, and not at its centre. Towards this centre it is that the moon always turns the same face; and the visual ray drawn thence to the centre of the moon would always meet its surface at the same point, abstracting from the preceding inequalities. It is not the same with respect to the visual ray drawn from the surface of the earth; for this ray makes a sensible angle with the former, by reason of the proximity of the moon; this angle is at the horizon, equal to the horizontal parallax: in consequence of this difference the apparent contour of the lunar spheroid is not the same for the centre of the earth, and to an observer placed at its surface. This, when the moon rises, causes some points to be discovered towards its upper edge, which could not have been perceived from the centre of the earth: as the moon rises above the horizon, these points continue to approach the upper edge of the disc, and at length disappear, while others become visible to its lower edge: the same effect is continued during all the time that the moon is visible; and, as the part of its disc which appears highest at its rising is found lowest at its setting, these are the two instants when the difference is most perceptible. Thus the lunar globe in its diurnal motion appears to oscillate about the radius vector drawn from its centre to the centre of the earth. This phænomenon is designated by the name of diurnal libration.

LIBRATION OF THE EARTH, is a term applied by some astronomers to that motion, whereby the earth is so retained within its orbit, as that its axis continues constantly parallel to the axis of the world. See PARALLELISM.

This Copernicus calls the motion of libration; and may be illustrated thus: suppose a globe, with its axis parallel to that of the earth, painted on the flag of a mast, moveable on its axis, and constantly driven by an east wind, while it sails round an island; it is evident, the painted globe will be so librated, as that its axis will be parallel to that of the world, in every situation of the ship.

LI'BRATORY. *a.* (from *libro*, Lat.) Balancing; playing like a balance.

LIBURNIA, now Croatia, a country of Illyricum, between Istria and Dalmatia, whence a colony came to settle in Apulia, in Italy.

LIBURNUM MARE, the sea which borders on the coasts of Liburnia.

LIBYA, a daughter of Epaphus and Cassiopea, who became mother of Agenor and Belus by Neptune.

Libya, in general, according to the Greeks, denoted Africa. An appellation derived from *lub*, "thirst," being a dry and thirsty country.

In a more restrained sense, the middle part of Africa, extending north and west (Pliny); between the Mediterranean to the north, and Ethiopia to the east; and was two-fold, the Hither or Exterior Libya; and the Farther or Interior. The former lay between the Mediterranean on the north, and the Farther Lybia and Ethiopia beyond Egypt on the south (Ptolemy). The Farther or Interior Lybia was a vast country, lying between the Hither Libya on the north, the Atlantic ocean on the west, the Ethiopic on the south, and Ethiopia beyond Egypt on the east (Ptolemy).

In a still more restrained sense, it was called, for distinction's sake, Libya Propria, was a northern district of Africa, and a part of the Hither Libya; situated between Egypt to the east, the Mediterranean to the north, the Syrtis Major and the Regio Tripolitana to the west, the Garamantes and Ethiopia beyond Egypt to the south. Now the kingdom and desert of Barca. This Libya was again subdivided into Libyia taken in the strictest sense of all, and into Marmarica and Cyrenaica. Libya in the strictest sense, otherwise the Exterior, was the most eastern part of Lybia Propria, next to Egypt, with Marmarica on the west, the Mediterranean on the north, and the Nubi, now called Nubia, to the south (Ptolemy.)

LICE, the plural of *louse* (*Dryden*).

LI'CEBANE. *s.* (*lice* and *bane.*) A plant.

LI'CENSE. *s.* (*licentia*, Lat.; *licence*, Fr.) 1. Exorbitant liberty; contempt of legal and necessary restraint (*Sidney*). 2. A grant of permission (*Addison*). 3. Liberty; permission (*Acts*).

*To* Li'cense. *v. a.* (*licencier*, French.) 1. To permit by a legal grant (*Pope*). 2. To dismiss: not in use (*Wotton*).

LI'CENSER. *s.* (from *license.*) A granter of permission.

LICENSES, in music, are liberties taken either with the composition, or in the notation: among the latter the following are the most generally allowed.

Three notes tied together, and having the numerical figure 3 over them are performed in the time of two notes of the same kind. Five notes tied together, and having the figure 5 over them, are performed in the time of four of the same kind.

Six notes tied together, and having the figure 6 over them, are performed in the time of four of the same kind; and

Nine notes tied together, and having the figure 9 over them, are performed in the time of eight of the same kind.

There are also certain abbreviations which, although of modern introduction, are now in general use. This mark set against a note divides it into quavers; this divides it into semiquavers; and this into demisemiquavers. This mark by itself implies that the quavers preceding it in the same bar are to be repeated; this that the semiquavers preceding it are to be repeated; and this that the demisemiquavers preceding it are to be repeated.

LICE'NTIATE. *s.* (*licentiatus*, low Lat.) 1. A man who uses license (*Camden*). 2. A degree in Spanish universities (*Ayliffe*).

*To* Lice'ntiate. *v. a.* (*licentier*, Fr.) To permit; to encourage by license (*L'Estrange*).

LICE'NTIOUS. *a.* (*licentiosus*, Latin.) 1. Unrestrained by law or morality (*Shak.*). 2. Presumptuous; unconfined (*Roscommon*).

LICE'NTIOUSLY. *ad.* With too much liberty; without just restraint.

LICE'NTIOUSNESS. *s.* Boundless liberty; contempt of just restraint (*Swift*).

LICH. *s.* (lice, Sax.) A dead carcase; whence *lichwake*, the time or act of watching by the dead; *lichgate*, the gate through which the dead are carried to the grave; *Lichfield*, the field of the dead, a city in Staffordshire, so named from martyred christians.

Lich, a town of Germany, in the circle of the Upper Rhine, and principality of Hohen Solms, situated on the Wetter: twelve miles E.S.E. Weizlar, and thirty-six N.E. Mentz. Lon. 26. 30 E. Ferro. Lat. 50. 21 N.

LICHAIA, a river of Russia, in the country of the Cosacs, which runs into the Donetz, near Bistraia.

LICHANOS, in music, the name given by the ancient Greeks to the third chord of their two first tetrachords. See Lichanos Meson, and Lichanos Hypaton.

Lichanos Hypaton. (Greek.) Index of principals. The name given by the ancients to the third sound of the first or lowest tetrachord in the diatonic genus: so called from its having been played with the index or forefinger. This sound which answered to our D on the third line in the bass, was also denominated Hypaton Diatonos.

Lichanos Meson. (Greek.) The name by which the ancients distinguished the third sound of the meson, or middle tetrachord. This sound corresponded with that of our G on the fourth space in the bass.

LICHAS, a servant of Hercules who brought him the poisoned tunic from Dejanira. He was thrown by his master into the sea, and changed into a rock by the compassion of the gods.

LICHEN. (*lichen*, λειχην, or λιχην, a tetter or ring-worm). In medicine, an exanthematous affection of the skin of a peculiar kind, but exhibiting several varieties. Lichen is by

# BOTANY.

PL. CVII.

LICHEN.


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extends to the skin in the interstices of the papulæ.

LICHEN. (from *lichen*, a tetter or ringworm, because it was formerly supposed to be of use in curing this complaint.) In botany, a genus of the class cryptogamia, order algæ. Fructification in tubercles or shields, invested with their proper cortical receptacles, on a variously formed and constructed frond. Nearly six hundred species, of which between two and three hundred are indigenous to our own country. See Botany, Pl. CVII. They may be thus subdivided:

A Receptacle or outer-coat of the fructification compact, hardish, of a different substance from the frond.

I. Those, of this subdivision with black shields; flat, oblong, elliptic, linear, or variously formed, opening longitudinally, simple or confluent or branched, with a crustaceous frond, are called Opegrapha.

II. Those with shields or tubercles sessile, hardish, orbicular or deformed by mutual pressure; their discs flattish or becoming convex, often with a thickish margin, nearly the colour of the disc; frond crustaceous, foliaceous, stellate, or umbilicate, are denominated Lecidea.

The lecidea are again subdivided.

α. Frond crustaceous, uniform. These are named Catillaria.

β. Frond crustaceous, imbricate, or lobed Lepidoma.

γ. Frond foliaceous, stellate fibrous underneath. Saphenaria.

δ. Frond foliaceous, peltate. Omphalaria.

III. Tubercles hardish, mostly seated on a stalk, becoming shield-like and margined; frond crustaceous. These are called Calicium.

IV. Tubercles sessile, convex or hemispheric, black, variously plaited, closed, irregularly bursting when old; frond foliaceous, membranaceous, or cartilaginous. These are named Gyrophora.

V. Tubercles nearly globular, black, with from one to four round, hollow cells, each covered with a wart-like deciduous lid; frond crustaceous. Bathelium.

B Receptacle or outer coat of the fructification of the same substance and colour as the frond.

I. Receptacle compound: the outer raised above the crust, and wart-like: formed from the frond, perforated with a pore or two or cup-like, including the inner which is globular or flattish: frond crustaceous, uniform. This sub-partition is named Thelotrema.

II. Tubercles roundish, terminal, inclosing a globular nucleus, at first closed, at length irregularly opening and discharging the nucleus, which gradually moulders into a black dust; frond shrubby, solid, rigid. Sphærophoron.

III. Tubercles somewhat discoid, terminal, at first covered with the frond, at length bursting through, and bearing small central-coloured globules which eventually fall off; frond crustaceous, papillary, or branched. Isidium.

IV. Shields immersed in the frond, concave, invested with a margin from the frond; frond crustaceous uniform. Urceolaria.

V. Shields thickish, raised above the frond with a distinct margin of the colour and substance of the frond: frond various. Parmelia.

This is again subdivided,

α. Frond crustaceous, uniform. Lecanaria.

β. Frond crustaceous, composed of imbricate scales. Psoroma.

γ. Frond crustaceous, flat with a lobed or radiate circumference. Placodium.

δ. Frond foliaceous, somewhat membranous, depressed, stellate, more or less imbricate, fibrous underneath. Circinaria.

ε. Frond leafy, somewhat coriaceous, with vague, lax expanded lobes, villous underneath. Lobaria.

ζ. Frond foliaceous, gelatinous, variously formed. Collema.

η. Frond leafy, membranous, depressed; segments linear, somewhat imbricate, vaulted or inflected at the tips. Physica.

θ. Frond leafy, membranous, tufted, laciniate-branched, fistular; branches cylindrical, obtuse, bearing the shields at their tips. Cenotea.

ι. Frond leafy, membrano-cartilaginous; tufted, segments rather erect, linear, tapering, longitudinally channelled underneath. Canalicularia.

κ. Frond somewhat leafy, cartilaginous, or leathery; segments erect or pendent, flat or cylindrically compressed, fitted, tapering, branched, naked, glabrous. Polymesia.

λ. Frond filamentous, somewhat cartilaginous, branched; filaments nearly cylindric, pendulous or diffuse. Tricharia.

VI. Frond leafy, membranous, or somewhat coriaceous, lobed; bearing membranous, sessile, flat, orbicular shields on the upper surface, and mealy shields like white or yellowish pits among the down on the under surface. Shita.

VII. Shields thin, membranous, sessile, generally flat, closely attached by their margins to the frond: frond leathery, or membranous; mostly with downy or fibrous veins underneath: the fertile lobes long ascending and naked beneath. Peltidea.

VIII. Shields flat, sessile, attached to the frond by their margin, frond leafy, membrano-cartilaginous, lobed, rigid, glabrous, naked on both sides. Cetraria.

IX. Shields terminal, flat, peltate, cartilaginous, becoming irregular, and a little convex with the margin reflected; frond cartilaginous, rigid, nearly solid, spongy within, in shrub-like tufts, with acute branches. Cornicularia.

X. Tubercles sessile, terminal and scattered, somewhat turbinate, at the first margined, at length convex, covered with a mem-

brane: frond solid, rather woody, cerulescent, branched, roughish and fibrous. Stereocaulon.

XI. Tubercles terminal, mostly on pedicels, becoming convex or cup-like, simple or clustered, covered with a thin solid membrane: frond crustaceous or leafy. Bæomices. This again is subdivided into five inferior partitions, which, being of less moment we shall not stay to describe.

The chief species:

1. L. candelarius. Yellow farinaceous lichen; common upon walls, rocks, boards, and old pales.

2. L. parellus. Craw-fish eye lichen; found also on walls and rocks but not very frequently.

3. L. parietinus. Common yellow wall-lichen: very common upon walls, rocks, tiles of houses, and trunks of trees.

4. L. prunastri. Common ragged hoary lichen; growing upon all sorts of trees parasitically; but generally most white and hoary on the sloe, or old palm trees, or the tops of old pales.

5. L. caninus. Ash-coloured ground liverwort; found on the ground among moss at the roots of trees in shady places, sometimes on heaths and in stony places. The lichen cinereus terrestris of the dispensatories, with a weak, faint smell, and a sharpish taste. It was for a long time highly extolled as a medicine of singular virtue, in preventing and curing that dreadful disorder which is produced by the bite of rabid animals, but now deservedly forgotten. See PULVIS ANTILYSSUS.

6. L. cocciferus, for which see MUSCUS PYXIDATUS.

7. L. islandicus. The medicinal qualities of the lichen islandicus have lately been so well established at Vienna, that this plant is now admitted into the materia medica of the Edinburgh pharmacopœia. It is extremely mucilaginous, and to the taste is bitter, and somewhat adstringent. Its bitterness, as well as the purgative quality which it manifests, in its recent state, are in a great measure dissipated on drying, or may be extracted by a slight infusion in water, so that the inhabitants of Iceland convert it into a tolerably grateful and nutritive food. An ounce of this lichen, boiled a quarter of an hour in a pint of water, yielded seven ounces of a mucilage as thick as that procured by the solution of one pint of gum arabic in three of water.

The medical virtues of this lichen were probably first learned from the Icelanders, who employ it in its fresh state as a laxative; but when deprived of this quality and properly prepared, we are told that it is an efficaceous remedy in consumptions, coughs, dysenteries, and diarrhæas. Scopoli seems to have been the first who of late years called the attention of physicians to this remedy in consumptive disorders; and further instances of its success are related by Herz, Cramer, Tromsdorff, Ebeling, Paulisky, Stoll, and others, who bear testimony of its efficacy in most of the other complaints above mentioned. Dr. Herz says, that since he first used the lichen in dysentery, he found it so successful, that he never had occasion to employ any other remedy; it must be observed, however, that cathartics and emetics were always repeatedly administered before he had recourse to the lichen, to which he also occasionally added opium. Dr. Crichton informs us, that during seven months residence at Vienna, he had frequent opportunities of seeing the lichen islandicus tried in phthisis pulmonalis at the general hospitals, and confesses, "that it by no means answered the expectation he had formed of it." He adds, however, "from what I have seen, I am fully convinced in my own mind that there are only two species of this disease where this sort of lichen promises a cure. The two species I hint at, are the phthisis hæmoptoica, and the phthisis pituitosa or mucosa. In several cases of these I have seen the patients so far get the better of their complaints as to be dismissed the hospital cured, but whether they remained long so or not I cannot take upon me to say." That this lichen strengthens the digestive powers, and proves extremely nutritious, there can be no doubt; but the great medicinal efficacy attributed to it at Vienna will not readily be credited at London. It is commonly given in the form of a decoction; an ounce and a half of the lichen being boiled in a quart of milk. Of this a tea-cupful is directed to be drank frequently in the course of the day. If milk disagree with the stomach, a simple decoction of the lichen in water is to be used. Care ought to be taken that it be boiled over a slow fire, and not longer than a quarter of an hour. The Iceland moss grows also on various mountains both of the highlands and lowlands of Scotland. Its fronds are nearly erect, about two inches high, and stiff when dried.

8. L. pyxidatus. Cup-moss. See MUSCUS PYXIDATUS.

9. L. roccella. See ROCCELLA.

10. L. saxatilis. See USNEA.

LICHFIELD, or LITCHFIELD, a small city of England, in the county of Stafford, situated on a small river which runs into the Trent, about three miles from the town. It is a county of itself, with power of holding assizes, and determining cases of life and death. It was erected into an archbishopric in the latter part of the eighth century by king Offa, but soon after it was reduced to a bishopric, under the archbishopric of Canterbury. In the year 1075, the see was removed to Chester; and in 1102, to Coventry; but, not long after, was restored to Litchfield, united with Coventry. The cathedral was first built in the year 300, and has been several times rebuilt and enlarged; particularly by bishop Hacket, after the restoration, in the last century, and in the year 1789, when it underwent a thorough repair. Here are three other churches, and formerly there was a castle, now destroyed. The south side of the river is called the city, and the other the close. When the civil war broke out, the close was garrisoned for the king,

against the army of the parliament, under Lord Brooke and Sir John Gill; but was taken after a month's siege. In the course of the war it was taken by prince Rupert, but fell at length, with the rest of the kingdom, to the republican party. It is governed by two bailiffs, recorder, burgess, &c. and sends two members to the British parliament. There are two markets weekly, on Tuesday and Friday: eighteen miles N.W. Coventry, and 119 N.W. London. Lon. 1. 44 W. Lat 52. 41 N.

LICHTENAU, a town of Franconia, in the margravate of Anspach, with a fortress on the Rezel, 17 miles S.W. of Nuremberg, and subject to that city. Lon. 11. 12 E. Lat. 49. 10 N.

LICHTENBERG, a castle of France, in the department of Lower Rhine, seated on a rock, near the Vosges mountains, and considered as impregnable. It is twelve miles N.N.W. of Haguenau.

LICHTENBERG, a town and castle of Germany, in the duchy of Deux Ponts, 25 miles N. of Deux Ponts.

LICHTENBERG, a town of Germany, in Franconia. In the neighbourhood are quarries of marble, and mines of copper and iron. It is 22 miles N. of Bayreuth, and 26 E. of Coburg. Lon. 11. 41 E. Lat. 50. 16 N.

LICHTENBURG, a town of Franconia, in the margravate of Cullembach, 20 miles N.E. of Cullembach. Lon. 12. 2 E. Lat. 50. 25 N.

LICHTENFELS, a town of Franconia, in the bishopric of Bamberg, seated on the Maine, 15 miles N.E. of Bamberg. Lon. 11. 12 E. Lat. 50. 16 N.

LICHTENSTEIN, a town of Swisserland, capital of the county of Tockenburgh, seated on the Thur, 31 miles E. of Zuric. Lon. 9. 8 E. Lat. 47. 15 N.

LICHTENSTEIN, a principality of Germany, in the circle of Suabia.

LICHTENSTEIN, a castle and village in the archduchy of Austria, nine miles S.S.W. of Vienna.

LICINIUS (C.), a tribune of the people, celebrated for the consequence of his family, his intrigues, and abilities. He was a plebian, and the first of that body who was raised to the office of a master of horse to the dictator. He was sirnamed *Stolo*, or *useless sprout*, on account of the law enacted during his tribuneship, which forbade any person to possess 500 acres of land, or keep more than 100 head of large cattle, or 500 small. He afterwards made a law which permitted the plebians to share the consular dignity with the patricians, A. U. C. 388. He reaped the benefits of this law, and was one of the first plebian consuls.—2. C. Calvus, a celebrated orator and poet in the age of Cicero. He distinguished himself by his eloquence in the forum, and his poetry, which some of the ancients have compared to Catullus. His orations are greatly commended by Quintilian. He died in the 30th year of his age.—3. P. Tegula, a comic poet of Rome about 200 years before Christ. He is ranked as the fourth of the best comic poets which Rome produced. Few lines of his compositions are extant.—4. C. Flavius Valerianus, a celebrated Roman emperor. His father was a poor peasant of Dalmatia, and himself, at first, a common soldier in the Roman armies. His valour recommended him to Galerius Maximianus, who had once shared with him subordinate offices of the army, and had lately been invested with the imperial purple by Diocletian. Galerius showed his regard for his merit by taking him as a colleague in the empire, and appointed him over the province of Pannonia and Rhœtia. Constantine, who was also one of the emperors, gave him his sister Constantia in marriage, A. D. 313. The successes of Licinius increased his pride, and rendered him jealous of the greatness of his brother-in-law. The persecutions of the Christians soon caused a rupture, and Licinius lost two battles, one in Pannonia, and the other near Adrianopolis. Treaties of peace were made, but soon broken by Licinius, who was defeated in a decisive battle near Caledonia. He fled to Nicomedia, where the conqueror obliged him to resign the imperial purple. Constantia obtained forgiveness for her husband, yet Constantine knew what an active enemy had fallen into his hands, therefore he ordered him to be strangled at Thessalonica, A. D. 324. His family was involved in his ruin.

*To* LICK. *v. a.* (liccan, Saxon.) 1. To pass over with the tongue (*Addisen*). 2. To lap; to take in by the tongue (*Shakspeare*). 3. *To* LICK *up*. To devour (*Pope*).

LICK. *s.* (from the verb.) A blow (*Dry.*).

LI'CKERISH. LI'CKEROUS. *a.* (liccepa, a glutton, Saxon.) 1. Nice in the choice of food; squeamish (*L'Estrange*). 2. Eager; greedy to swallow (*Sidney*). 3. Nice; tempting the appetite (*Milton*).

LI'CKERISHNESS. *s.* (from *lickerish.*) Niceness of palate.

LICOLA, a lake in the kingdom of Naples, formerly famous for excellent fish; but, in 1538, an earthquake happened, which changed one part of it into a mountain of ashes, and the other into a morass. It was anciently known by the name of the Lucrine Lake.

LICONIA, in botany; a genus of the digynia order, belonging to the pentandria class of plants. There are five petals inlaid in the pit of the nectarium at its base; the capsule is bilocular and seed-bearing.

LICORICE. See GLYCYRRHIZA.

LICTORS (Axe-bearers), among the Romans, were officers established by Romulus, who always attended the chief magistrates when they appeared in public.

The duty of their office consisted in the three following particulars: 1. Submitio, or clearing the way for the magistrate they attended: this they did by word of mouth; or, if there was occasion, by using the rods they always carried along with them. 2. Animadversio, or causing the people to pay the usual

respect to the magistrate, as to alight, if on horseback, or in a chariot; to rise up, uncover, make way, and the like. 3. Præitio, or walking before the magistrates: this they did not confusedly, or all together, nor by two or three abreast, but singly following one another in a straight line. They also preceded the triumphal car in public triumphs; and it was also part of their office to arrest criminals, and to be public executioners in beheading, &c. Their ensigns were the fasces and securis.

As to the number of lictors allowed each magistrate, a dictator had twenty-four, a master of the horse six, a consul twelve, a prætor six; and each vestal virgin, when she appeared abroad, had one.

LICUALA. In botany, a genus of the class tetrandria, order monogynia. Calyx three-parted; corol three-parted; nectary truncate, wreath-like; drupe one-seeded. One species: a Molucca palm with a single jointed trunk.

LID. *s.* (hlið, Saxon.) 1. A cover; any thing that shuts down over a vessel (*Addison*). 2. The membrane that, when we sleep or wink, is drawn over the eye (*Prior*).

LIDA, a town of Lithuania, in the palatinate of Wildna, 56 miles S. of Wilna. Lon. 25. 34 E. Lat. 53. 50 N.

LIDBE'CHIA. In botany, a genus of the class syngenesia, order polygamia superflua. Receptacle naked; downless; seeds angular with the lowermost joint of the style permanent; floret of the ray numerous. Calyx many-parted. Three species: plants of the Cape.

LIDDEL, a river in Roxburghshire, and the only one in that county that flows southward. It falls into Solway Frith, near the mouth of the Esk.

LIDDISDALE, a district in Roxburghshire, comprehending the southern angle of that county. It admits of little cultivation, and is chiefly employed in pasture.

LIDFORD, a village in Devonshire, on the river Lid, seven miles N. of Tavistock. It was once a borough, with a castle; and its parish may now compare for lands and liberties with any in the kingdom, the whole forest of Dartmoor being in the verge of it. The river here being pent up at the bridge with rocks, has made itself so deep a fall by its continual working, that passengers only hear the noise of the water without seeing it.

LIE. *s.* (*lie*, Fr.) Any thing impregnated with some other body; as, soap or salt (*Peacham*).

Lie. *s.* (liʒe, Saxon.) 1. A criminal falsehood (*Watts*). 2. A charge of falsehood (*Locke*). 3. A fiction (*Dryden*). The late archdeacon Paley, in treating of this subject, observes, that there are falsehoods which are not lies; that is, which are not criminal: and there are lies which are not literally and directly false.

I. Cases of the first class are those, 1. Where no one is deceived: as for instance in parables, fables, novels, jests, tales to create mirth, or ludicrous embellishments of a story, in which the declared design of the speaker is not to inform, but to divert; compliments in the subscription of a letter; a prisoner's pleading not guilty; an advocate asserting the justice, or his belief of the justice, of his client's cause. In such instances, no confidence is destroyed, because none was reposed; no promise to speak the truth is violated, because none was given or understood to be given. 2. Where the person you speak to has no right to know the truth, or, more properly, where little or no inveniency results from the want of confidence in such cases; as where you tell a falsehood to a madman for his own advantage; to a robber to conceal your property; to an assassin to defeat or divert him from his purpose. It is upon this principle, that, by the laws of war, it is allowed to deceive an enemy by feints, false colours, spies, false intelligence, and the like: but by no means in treaties, truces, signals of capitulation, or surrender: and the difference is, that the former suppose hostilities to continue, the latter are calculated to terminate or suspend them.

Many people indulge in serious discourse a habit of fiction and exaggeration, in the accounts they give of themselves, of their acquaintance, or of the extraordinary things which they have seen or heard; and so long as the facts they relate are indifferent, and their narratives though false are inoffensive, it may seem a superstitious regard to truth to censure them merely for truth's sake. Yet the practice ought to be checked; for, in the first place, it is almost impossible to pronounce beforehand, with certainty, concerning any lie, that it is inoffensive; or to say what ill consequences may result from a lie apparently inoffensive: and, in the next place, the habit when once formed, is easily extended to serve the designs of malice or interest; like all habits, it spreads indeed of itself. Pious frauds, as they are improperly enough called, pretended inspirations, forged books, counterfeit miracles, are impositions of a more serious nature. It is possible that they may sometimes, though seldom, have been set up and encouraged with a design to do good; but the good they aim at requires, that the belief of them should be perpetual, which is hardly possible; and the detection of the fraud is sure to disparage the credit of all pretensions of the same nature. Christianity has suffered more injury from this cause than from all other causes put together.

II. As there may be falsehoods which are not lies, so there may be lies without literal or direct falsehood. An opening is always left for this species of prevarication, when the literal and grammatical signification of a sentence is different from the popular and customary meaning. It is the wilful deceit that makes the lie; and we wilfully deceive when our expressions are not true, in the sense in which we believe the hearer apprehends them. Besides, it is absurd to contend for any sense of words, in opposition to usage; for all senses of all words are founded upon usage, and upon nothing else. Or a man may act a lie; as by

pointing his finger in a wrong direction, when a traveller inquires of him his road; or when a tradesman shuts up his windows, to induce his creditors to believe that he is abroad: for to all moral purposes, and therefore as to veracity, speech and action are the same; speech being only a mode of action.

*To* Lie. *v. n.* (leoȝan, Sax. *liegen*, Dutch.) 1. To utter criminal falsehood (*Shakspeare*). 2. To exhibit false representation (*Swift*).

*To* Lie. *v. n.* pret. *I lay*; *I have lain* or *lien*. (lieȝan, Saxon; *liggen*, Dutch.) 1. To rest horizontally, or with very great inclination against something else. 2. To rest; to press upon (*Shakspeare*). 3. To be reposited in the grave (*Genesis*). 4. To be in a state of decumbiture (*Mark*). 5. To pass the time of sleep (*Dryden*). 6. To be laid up or reposited (*Boyle*). 7. To remain fixed (*Temple*). 8. To reside (*Genesis*). 9. To be placed or situate, with respect to something else (*Collier*). 10. To press upon afflictively (*Creech*). 11. To be troublesome or tedious (*Addison*). 12. To be judicially imputed (*Shakspeare*). 13. To be in any particular state (*Watts*). 14. To be in a state of concealment (*Locke*). 15. To be in prison (*Shakspeare*). 16. To be in a bad state (*L'Estrange*). 17. To be in a helpless or exposed state (*Swift*). 18. To consist (*Shakspeare*). 19. To be in the power; to belong to (*Stillingfleet*). 20. To be valid in a court of judicature: as, *an action* lieth *against one*. 21. To cost: as, *it* lies *me in more money*. 22. *To* Lie *at*. To importune; to tease. 23. *To* Lie *by*. To rest; to remain still (*Shakspeare*). 24. *To* Lie *down*. To rest; to go into a state of repose (*Isaiah*). 25. *To* Lie *down*. To sink into the grave (*Job*). 26. *To* Lie *in*. To be in childbed (*Wiseman*). 27. *To* Lie *under*. To be subject to; to be oppressed by (*Smalridge*). 28. *To* Lie *upon*. To become the matter of obligation or duty (*Bentley*). 29. *To* Lie *with*. To converse in bed (*Shakspeare*).

LIEF. *a.* (leof, Saxon.) Dear; beloved (*Spenser*).

Lief. *ad.* Willingly (*Shakspeare*).

LIEGE. *a.* (*lige*, French.) 1. Bound by some feudal tenure; subject. 2. Sovereign (*Spenser*).

Liege. *s.* Sovereign; superiour lord (*Phil.*)

Liege (*Ligius*), in law, properly signifies a vassal, who holds a kind of fee, that binds him in a closer obligation to his lord than other people. The term seems to be derived from the French *lier*, to bind; on account of a ceremony used in rendering faith or homage; which was by locking the vassal's thumb or his hand in that of the lord, to show that he was fast bound by his oath of fidelity. Cujas, Vigenere, and Bignon, choose rather to derive the word from the same source with *leudis* or *leodi*, loyal, faithful. But Du Cange falls in with the opinion of those who derive it from *liti*, a kind of vassals, so firmly attached to their lord, on account of lands or fees held of him, that they were obliged to do him all manner of service, as if they were his domestics. He adds, this was formerly called *litgium servitium*, and the person *lige*. In this sense the word is used, Leg. Edw. cap. 29. *Judæi sub tutela regis ligea debent esse*, that is, wholly under his protection.

By liege homage, the vassal was obliged to serve his lord towards all, and against all, excepting his father. In which sense the word was used in opposition to simple homage; which last only obliged the vassal to pay the rights and accustomed dues to his lord; and not to bear arms against the emperor, prince, or other superior lord: so that a liege man was a person wholly devoted to his lord, and entirely under his command. "Omnibus &c. Reginaldus, rex Insulaum, salutem. Sciatis quod deveni homo ligeus domini regis Angliæ Johannis, contra omnes mortales, quamdiu vixero; & inde ei fidelitatem & sacramentum præstiti, &c." MS. penes W. Dugdale.

But it must be observed, there were formerly two kinds of liege homage; the one by which the vassal was obliged to serve his lord against all, without exception even of his sovereign; the other, by which he was to serve him against all, except such other lords as he had formerly owed liege homage to.

In our old statutes, lieges, and liege people, are terms peculiarly appropriated to the king's subjects; as being *liges*, *ligi*, or *ligati*, obliged to pay allegiance to him; 8 Henry VI. 14 Henry VIII. &c. though private persons had their lieges too. "Reinaldus, Dei gratia, abbas Ramesiæ, præposito & hominibus de Brancestre, & omnibus vicinis Francis & Anglis, salutem. Sciatis me dedisse terram Ulfe, in depedene (hodie depedale) huic Boselino, & uxori ejus Alfniæ—ea conditione quod effecti sint homines leges." Lib. Rames.

Liege, a bishopric of Westphalia, bounded on the north by Brabant and Guelderland, on the east by the duchies of Limburg and Juliers, on the south by Luxemberg and the Ardennes, and on the west by Brabant and the county of Namur. It is fruitful in corn and fruits, and contains mines of iron, lead, and coal, besides quarries of marble. The bishop is elected by the chapter, composed of 60 canons; he is one of the most considerable ecclesiastical princes of Germany, and has an annual revenue of 300,000 ducats.

Liege, the capital city of the bishopric of the same name in Germany, is large, populous, wealthy, and remarkable for its antiquity, the magnificence of its public buildings, and the vast number of its churches. It is seated in a valley surrounded by high mountains, separated from each other by pleasant dales, which are watered by three little rivers; there are several hills and vallies within the walls, which are about four miles in circumference, and some islands made by the river Maese, two branches of which run through the town. It is divided into three parts, the city, the island, and the Outer-Maese; it has 16 gates, 17 bridges, and 154 streets; these last are pretty broad, but are neither clean nor regular; and most of the private houses are built of wood;

a clear stream generally runs through the middle of the streets, and many of the best houses have fountains in their courts and gardens. Here are upwards of 100 churches; and the cathedral, dedicated to St. Lambert, is a magnificent structure built with stone, and within are a great number of relics: the busto of St. Lambert is in silver, as also the statues of the Virgin Mary and Joseph, as big as life; five great coffers, which hold the relics, are of silver, and St. George on horseback is of massy gold. They have vestments given by pope Gregory, adorned with large pearls, intermixed with diamonds. St. Peter's is the most admirable of the parish churches, being set off with marble ornaments and paintings: all the religious orders have handsome convents and churches. This city is governed by two burgomasters, twenty counsellors, two perpetual counsellors, and a recorder; besides which they have a chief mayor and two subordinate mayors. The town is seated very conveniently for trade, on account of the river Maese, which is navigable up to this place. This city was bombarded in 1691, and delivered to the French in 1701; it was retaken by the allies in 1702; and the French attempted to get possession of it again in 1705, at the approach of the duke of Marlborough; but it was restored to its bishop by the treaty of Baden. In 1792 the French took the city, and effected another revolution; but being driven thence, in 1793, the citizens were once more obliged to submit. Liege is 15 miles south-west of Maestricht, and 62 south-west of Cologne. Lon. 5. 40 E. Lat. 50. 37 N.

LI'EGEMAN. *s.* A subject: not in use (*Spenser*).

LI'EGER. *s.* (more proper *leger*.) A resident ambassadour (*Denham*).

LI'EN. The participle of *lie* (*Genesis*).

LIENTE'RICK. *a.* (from *lientery*.) Pertaining to a lientery (*Grew*).

LIENTERIA. (*lienteria*, λειεντερια, from λειος, smooth, εντερον, the intestine, and ῥεω, to flow.) A species of diarrhœa. See Diarrhœa.

LI'ER. *s.* (from *to lie*.) One that rests or lies down, or remains concealed (*Joshua*).

LIEU. *s.* (Fr.) Place; room; stead (*Add.*)

LIEVE. *ad.* (See Lief.) Willingly (*Shakspeare*).

LIEVENS (John), an historical and portrait painter, was born in 1607 at Leyden. His fame was so great at the age of 20, that Charles I. invited him to his court, and he accordingly went thither, and had the honour of painting the portraits of all the royal family, and most of the nobility. He remained in England three years, and then went back to Antwerp.

LIEUTAUD (Joseph), a French physician, was born at Aix in Provence, and became first physician to Louis XVI. and in 1752 member of the academy of sciences. His Anatomical Essays, and Elements of Physiology, are his principal works.

LIEUTE'NANCY. *s.* (*lieutenance*, Fr.) 1. The office of a lieutenant (*Shakspeare*). 2. The body of lieutenants (*Felton*).

LIEUTENANT, an officer who supplies the place, and discharges the office of a superior in his absence. Of these, some are civil, as the lords-lieutenants of kingdoms, and the lords-lieutenants of counties, and others are military, as the lieutenant-general, lieutenant-general of the artillery, lieutenant-colonel, lieutenant of the artillery of the Tower, lieutenant of horse, foot, ships of war, &c.

Lieutenant of Ireland (Lord), is a viceroy, and has all the state and grandeur of a king of England, except being served upon the knee. He has, or till lately had, the power of making war and peace, of bestowing all the offices under the government, of dubbing knights; and of pardoning all crimes except high treason, he also before the union called and prorogued the parliament, but no bill could pass without the royal assent. He is assisted in his government by a privy-council; and on his leaving the kingdom, he appoints the lords of the regency, who govern in his absence.

Lieutenants of counties (Lords), are officers who, upon any invasion or rebellion, have power to raise the militia, and to give commissions to colonels and other officers, to arm and form them into regiments, troops, and companies. Under the lords-lieutenants are deputy-lieutenants, who have the same power; these are chosen by the lords-lieutenants, out of the principal gentlemen of each county, and presented to the king for his approbation.

Lieutenant-general, an officer next in rank to the general; in battle, he commands one of the wings; in a march, a detachment, or a flying camp; also a quarter, at a siege, or one of the attacks when it is his day of duty.

Lieutenant, in the land-service, is the second commissioned officer in every company of both foot and horse, and next to the captain and who takes the command upon the death or absence of the captain.

Lieutenant of artillery. Each company of artillery has four: 1 first and 3 second lieutenants. The first lieutenant hath the same detail of duty with the captain; because in his absence he commands the company: he is to see that the soldiers are clean and neat; that their clothes, arms, and accoutrements are in good and serviceable order; and to watch over every thing else which may contribute to their health. He must give attention to their being taught the exercise, see them punctually paid, their messes regularly kept, and to visit them in the hospitals when sick. He must assist at all parades, &c. He ought to understand the doctrine of projectiles and the science of artillery, with the various effects of gunpowder, however managed or directed; to enable him to construct and dispose his batteries to the best advantage; to plant his cannon, mortars, and howitzers, so as to produce the greatest annoyance to an enemy. He is to be well skilled in the attack and defence of fortified places, and to be conversant in arithmetic, mathematics, mechanics, &c.

*Second* Lieutenant *in the Artillery*, is the same as an ensign in an infantry regiment, being the youngest commissioned officer in the company, and must assist the first lieutenant in the detail of the company's duty. His other qualifications should be equal to those of the first lieutenant.

Lieutenant *of a ship of war*, the officer next in command to the captain, and who governs the ship in his absence. In the British navy an officer must have served six years at sea, two of which he must have been mate or midshipman in some of the king's ships, before he can be appointed a lieutenant; he must also pass an examination. The number of lieutenants appointed to a ship is always in proportion to her rate, a first rate having six, and a sixth rate only one. In an engagement the station of the lieutenants is to superintend the manœuvre of the great guns, and observe that they are properly supplied with powder and shot, &c. The lieutenant ranks with captains of horse and foot.

LIEUTE'NANTSHIP. *s.* (from *lieutenant.*) The rank or office of lieutenant.

LIFE. *s.* plural *lives.* (lıpian, to live, Saxon.) 1. Union and co-operation of soul with body; vitality; animation (*Genesis*). 2. Present state (*Cowley*). 3. Enjoyment or possession of existence (*Prior*). 4. Blood, the supposed vehicle of life (*Pope*). 5. Conduct; manner of living with respect to virtue or vice (*Pope*). 6. Condition; manner of living with respect to happiness or misery (*Dryden*). 7. Continuance of our present state (*Locke*). 8. The living form (*Brown*). 9. Exact resemblance (*Denham*). 10. General state of man (*Milton*). 11. Common occurrences; human affairs; the course of things (*Asch.*) 12. Living person (*Shakspeare*). 13. Narrative of a life past (*Pope*). 14. Spirit; briskness; vivacity; resolution (*Sidney*). 15. Animated existence; animal being (*Thom.*) 16. System of animal nature (*Pope*).

LIFE, in natural philosophy, animal or vegetable existence; to which two departments the term is rigidly confined. The natural division under which this subject ought to be discussed, appears to be as follows:

I. Its mode of production or propagation.
II. Its essence or principle.
III. Its modifications or diversities.
IV. Its extent or duration.

Of these the first has been already considered under the articles Generation and Germination, and the third will constitute an important part of the article Physiology.

Under the present head, therefore, we can only briefly enter into a consideration of its *essence* or *principle*, and its *extent* or *duration*.

Principle of Life.

What is this power which in some sort or other equally pervades animals and vegetables? which extends from man to brutes, from brutes to zoophytes, from zoophytes to fuci and confervas? We do not here enter into the consideration of an intelligent or thinking principle;—but confine ourselves alone to that inferior but active power, upon which the identity and individuality of the being depends, and upon the failure of which, the individual system ceases, the organs lose their relative connection, and the whole becomes decomposed, and resolves itself apparently into earth air and water?

That simple life, in this view of the subject, is a natural principle, will perhaps be admitted by every school of philosophers, and in effect has been so admitted from the earliest periods of history: the only question being what is the material organ that secretes it, or the modification of matter on which it depends?

§ 1. This in the earliest writings of the Hebrew scriptures is asserted to be *the blood*: "*the life of the flesh* we are expressly told, *is in the blood*." Homer appears to allude to this very ancient opinion in a variety of places, and very frequently applies the epithet of purple to death or the cessation of life πορφυρεος θανατος; while Virgil alludes to it still more distinctly in a very common feature by which he designates the dying soldier.

Purpuream vomit ille animam.

Empedocles and Cristas in like manner believed life to be the blood itself.

The same idea has been occasionally supported and rendered fashionable, and occasionally relinquished and regarded as erroneous, till the present day, in which it has been revived and restored with arguments which it never before possest, by Mr. J. Hunter, in an express treatise upon this subject: in which he infers the existence of a living principle (and of the general living principle of the system) in the blood from its capability of contraction upon the application of certain stimuli; which power of contraction he observes bears a striking resemblance to the irritability or contractility of the muscles. And it is a curious fact in proof of this doctrine that in cases of asphyxy or sudden death from lightning, electricity, or a violent blow on the stomach, in which the muscles remain relaxed, the blood also remains uncoagulated and uncoagulable. "The difficulty," says he, "of conceiving that the blood is endowed with life while circulating, arises merely from its being a fluid, and the mind not being accustomed to the idea of a living fluid.—I shall endeavour, he contines, to shew that organization and life do not in the least depend upon each other; that organization may arise out of living parts and produce action; but that life can never arise out of, or depend on organization." The experiments here adverted to are highly plausible, but are chiefly confined to the phœnomena of eggs. "This living principle in the blood," he then adjoins, similar in its effect to the living principle in the solids, owes its existence to the same matter which belongs to the other, and is the *materia vitæ diffusa* of which every part of an animal has its portion. It is impossible to say, perhaps, where the living principle first begins in the blood: whether in the chyle itself, or not till that fluid mixes with the other blood, and receives its influence from the lungs." Hunter on the Blood, p. 20—96.

§ 2. Another very early hypothesis concerning the principle of life, and which has also descended in some shape or other to our own days, is that it depends upon a general harmony or consent between the different organs of which the vital frame consists. This opinion is said to have been first invented by Aristoxenus, who was first a pupil of Lampyri of Erythræ, afterwards of Xenophylus the Pythagorean, and lastly of Aristotle.

He was most excellently skilled in music, though by profession a physician, and to this addiction to music we probably owe the name of *harmony*, by which he designated this peculiar doctrine. The doctrine is stated and ably opposed by Lucretius, iii. 98.

Quam vis multa quidem sapientum turba putarunt
Sensum animi certâ non esse in parte locatum
Verum habitum quemdam vitalem corporis esse
Ἁρμονιαν Graiei quem dicunt; qui faciat nos
Vivere cum sensu nullâ quam in parte siet mens:
Ut bona sæpe valetudo quam dicitur esse
Corporis et non tamen hæc pars ulla valentis.

Here cleave we firm; though many a sage contends
The living sense no part specific frames,
But springs the vital product of the whole
This the GREEK schools term HARMONY—a sense
Of living power while still th' essential soul
No point appropriates—as corporeal health
Flows not from sections but the form entire.

GOOD.

It is well observed by Lucretius in reply to this fancied hypothesis, and the observation proves fatal to it, that sometimes one part of the system alone suffers, the rest continuing in perfect health; and that some organs are capable of being amputated without any injury to the general life of the frame, whilst no sooner are others effected, as the heart for example, than the life immediately begins to faint and flow away:

While, instant as the vital heat but ebbs,
The vital breath flies off,—pulsation stops,
And heart and limb all lifeless lie alike.

IBID.

The abbé Polignac in his Anti-Lucretius attempted to defend this theory, so far as it applies to corporeal life, but admits at the same time that it will not apply to a solution of animal or mental life. M. Luzac has adverted to it with complacency in our own days in his treatise "Du Droit Naturel, &c.;" and in the doctrine of Mr. Davy that regards life as a perpetual series of corpuscular changes, and the living body as the being in which these changes take place, we cannot but observe a leaning towards the same system.

§ 3. But the theory which, in some shape or other, has been best supported in all ages, and appears to be built upon the largest collection of facts, is that which refers the principle of life to a gasseous or aerial origin; the oxygen or Voltaic aura of the present day, or an aura that was supposed by the Epicureans to have a very considerable resemblance to these active fluids: concerning which we must refer the reader to Mr. Good's commentary upon Lucretius vol. i. p. 411: in which he enters at large into a comparison between the supposed essence of the vital power as held by this celebrated sect, as well as other philosophical sects of Greece, and as maintained in the present day in consequence of the developments of chemistry in the department of the gasses.

It becomes us however to state before we quit this part of our subject, that *breath*, *spirit*, and air, are terms employed in the earliest writings of the Jewish scriptures to express the principle of life, as well as *blood*: that Heraclitus regarded the soul as an exhalation; Parmenides as *fire* or perhaps rather *caloric*; Anaxagoras, and Anaximenes as a *subtile air* or gass. Plutarch indeed affirms of the Greek philosophers in general, that it was acknowledged by all of them that spirit is only attenuate or highly subtle matter; that the soul, which is an aura, preserves us alive, and hence that spirit and aura mean the same thing. Hence the φυσις of Hippocrates, the πνευμα of the author de Mundo, the *anima mundi* of Pythagoras, became jointly described in succeeding ages by the name of *callidum innatum*, as expressing the vital principle. It afterwards took the name of *anima vagetans*; and under the philosophical vagaries of Paracelsus *sidereal spirit*, which Van Helmont, with as little reason, changed for *archeus*; by which without venturing to assert it, he seems to imply a direct unity of the rational and living soul; but which was afterwards confined by Stahl to the former alone.

About the middle of the last century when Haller was asserting his theory of the vital principle which he described under the names *vis insita* and *vis nervea*. Dr. Whytt attempted a reformation of the Stahlian doctrine which excluded the independent, living principle. He supposes the soul to be present in different parts of the brain at the same time, while he considers this soul as immaterial and unextended.

The discovery of the irritable fibre in muscles; of the different gasses which are the boast of modern chemistry, and of the peculiar affinity which several of these possess, for the muscular fibre have, at length, thrown a ray of light upon this recondite subject, though the whole is still for the most part buried in impenetrable darkness.

Glisson is said to be the first discoverer of this principle in the solid fibre; which discovery was afterwards enlarged upon by Haller, who found, by a variety of experiments, that the irritability of muscles remains a long time after their connection with the brain is destroyed. To this power, as we have already observed, he gave the name of vis insita. Fothergill and Girtanner soon started oxygen as the principle of irritability; maintaining that while oxygen is the principle of irritability, irritability is the principle of life. Finally, Humboldt, and along with him most physiologists of the present day, have exchanged oxygen for the Galvanic or Voltaic fluid; and from the very astonishing effects which are found to be produced by this aura upon the recently dead, as well as the living fibre, there can be little doubt that, if it be not the principle of life itself (at least in animals), it performs a very important part in its production. Whether it be of equal importance in the life of vegetables, remains yet to be ascertained: plants do not appear to possess fibres affected by its action, and in the vegetable kingdom it is highly probable that oxygen maintains a far more powerful influence. May we be allowed to throw out a hint that perhaps it will hereafter appear that these two distinct principles characterize the chief difference between animal and vegetable life; the former being the result of Voltaic gass, the latter of oxygen. See VOLTAISM and OXYGEN.

DURATION OF LIFE.

This is a subject which equally interests the man and the philosopher; the individual and the community. What is the common term of life? and how often is it encroached upon and cut off

by a host of fatal diseases! not unfrequently consigning a numerous family of survivors to poverty at the moment that the deceased is consigned to the grave. This last consideration involves a *political*, as the preceding does a *physical* inquiry: and we shall briefly contemplate the subject under both views:

1. *Duration of Life considered physically.*

Immediately after the creation, when the world was to be peopled by one man and one woman, the ordinary term of life was upwards of 900 years. Immediately after the flood, when there were three males to stock the world, the term of life was cut shorter, and Shem was the only patriarch who attained 500. In the second century we find none that reached 240; in the third, none except Terah that saw 200; a considerable part of the world was by this time sufficiently peopled, and mankind had built cities, and was cantoned out into distant nations. Mr. Derham hence derives an argument (and upon a very sure foundation) for the interposition of a Divine Providence. By degrees as the number of mankind increased, longevity dwindled, till it came down at length to 70 or 80 years: and there it stood, and has continued to stand ever since the time of Moses. This is found a good medium, and by means hereof the world is neither overstocked, nor rendered too thin; but life and death keep a pretty equal pace.

That the common duration of man's life has been the same in all ages since the above period, is plain both from sacred and profane history. To pass by others, Plato lived to 81, and was accounted an old man: and the instances of longevity produced by Pliny, l. vii. c. 48. as very extraordinary, may most of them be matched in modern histories. In the following table are collected into one point of view the most memorable instances of long-lived persons, of whose age we have any authentic records. It is extracted from Mr. Whitehurst's Inquiry into the Origin and State of the Earth, with some additions by Dr. Fothergill:

| Names of the Persons. | Ages. | Places of Abode. | Living or Dead. |
|---|---|---|---|
| Thomas Parr | 152 | Shropshire | Died November 16, 1635. Phil. Trans. No. 44. |
| Henry Jenkins | 169 | Yorkshire | Died December 8, 1670. Phil. Trans. No. 221. |
| Robert Montgomery | 126 | Ditto | Died in ——, 1670. |
| James Sands | 140 | Staffordshire | Do. Fuller's Worthies, p. 47. |
| His Wife | 120 | Ditto | |
| Countess of Desmond | 140 | Ireland | Raleigh's Hist. p. 166. |
| ——— Eccleston | 143 | Ditto | Died ——, 1691 [a]. |
| J. Sagar | 112 | Lancashire | —— ——, 1668 [b]. |
| — Laurence | 140 | Scotland | Living —— —— [c]. |
| Simon Sack | 141 | Trionia | Died May 30, 1764. |
| Col. Thomas Winslow | 146 | Ireland | —— Aug. 26, 1766. |
| Francis Confir | 150 | Yorkshire | —— Jan. —, 1768. |
| Christ. J. Drakenberg | 146 | Norway | —— June 24, 1770 [d]. |
| Margaret Forster | 136 | Cumberland | Both living 1771. |
| ——— her daughter | 104 | Ditto | |
| Francis Bons | 121 | France | Died Feb. 6, 1769. |
| John Brookey | 134 | Devonshire | Living ——, 1777 [e]. |
| James Bowels | 152 | Killingworth | Died Aug. 15, 1656 [f]. |
| John Tice | 125 | Worcestershire | —— March, 1774 [g]. |
| John Mount | 136 | Scotland | —— Feb. 27, 1766 [h]. |
| A. Goldsmith | 140 | France | —— June —, 1706 [i]. |
| Mary Yates | 128 | Shropshire | —— — —, 1766 [k]. |
| John Bales | 126 | Northampton | —— April 5, 1k66 [l]. |
| William Ellis | 130 | Liverpool | —— Aug. 16, 1780 [m]. |
| Louisa Trexo, a Negress | 175 | Tucomea, S. America | Living October 5, 1780 [n]. |
| Margaret Platten | 138 | Lochneugh near Paisley | Lynche's Guide to Health. |
| Janet Taylor | 108 | Fintray, Scotland | Died Oct. 10, 1780. |
| Richard Lloyd | 133 | Montgomery | Lynche's Guide to Health. |
| Susannah Hilliar | 100 | Piddington, Northamptsh. | Died Feb. 19, 1781 [o]. |
| Ann Cockbolt | 105 | Stoke-Bruerne, *ib.* | —— April 5, 1775 [p]. |
| James Hayley | 112 | Middlewich, Cheshire | —— March 17, 1781 [q]. |

William Walker, aged 112, not mentioned above, who was a soldier at the battle of Edge-hill.

To which may be added the following list from Tilloch's Philosophical Journal, xx. 373, purposely limited, for the sake of brevity, to such as have attained 130, and lived in the eighteenth century:

| Year. | | Age. | Year. | | Age. |
|---|---|---|---|---|---|
| 1795 | David Cameron | 130 | 1776 | John Merriat | 136 |
| 1766 | John de Somel | 130 | 1772 | —— Richardson | 137 |
| 1766 | George King | 130 | 1793 | —— Robertson | 137 |
| 1767 | John Taylor | 130 | 1757 | William Cherpley | 138 |
| 1774 | William Beathi | 130 | 1768 | John M'Donough | 138 |
| 1778 | John Watson | 130 | 1770 | —— Fairbrother | 138 |
| 1780 | Robert Macbride | 130 | 1772 | Mrs. Clumpt | 138 |
| 1764 | Elizabeth Taylor | 131 | 1766 | Thomas Dobson | 139 |
| 1775 | Peter Gordon | 131 | 1785 | Mary Cameron | 139 |
| 1761 | Elizabeth Merchant | 133 | 1752 | William Laland | 140 |
| 1772 | Mrs. Keith | 134 | 1773 | Swarling, a Monk | 142 |
| 1767 | Francis Ague | 134 | 1773 | Charles M'Findlay | 143 |
| 1779 | John Brookey | 134 | 1757 | John Effingham | 144 |
| 1744 | Jane Harrison | 135 | 1782 | Evan Williams | 145 |
| 1759 | James Sheile | 136 | 1762 | A Polish Peasant | 157 |
| 1768 | Catherine Noon | 136 | 1797 | Joseph Sursington | 160 |

The preceding table includes *twelve* other persons who attained the same age of 130, within the same century.

To these we may also add John Rovin, who was born at Szatlova-Carank-Betcher, in the bannat of Temeswar, and lived to the age of 172; while his wife lived to that of 161, having been intermarried for the space of 147 years, and their youngest son being 99 years of age when the father died. And Peter Zorten, a peasant, and countryman of Rovin's, who died in 1724, at the age of 185, his youngest son being 97 years old. The history and whole length pictures of John Rovin, Henry Jenkins, and Peter Zorten, were to be seen before the Revolution, in the library of his royal highness Prince Charles, at Brussels.

The Russian bills of mortality of the heptarchy of Pinsask, for the year 1805, contain the following instances of long life: five of 110 years of age; one of 113; four of 120; one of 128; one of 130; and one of 150.

Two conclusions may be drawn from these premises: first, that the life of man does not, in any degree, grow shorter in proportion to the length of time the world has existed; and next, that although longevity may perhaps be more frequent in some districts than in others, yet that it is by no means restricted to any particular district.

In the days of Moses, the ordinary limits of human life, as appears from his pathetic prayer constituting the 90th Psalm, did not exceed 70 or 80 years. No king of Judah lived beyond that period. When the Romans, however, were numbered by Vespasian, there were found in the empire, in that age of effeminacy, 10 men, aged an hundred and twenty and upwards. Among the princes of modern times, Frederick the Great, of Prussia, lived to the age of 74; George I. of Great Britain, to that of 83; George II. to that of 77; and his present Majesty has already reached the 73d year of his life, and the 50th of his reign. Lewis XIV. of France was 77 years old. Stanislaus, king of Poland and duke of Lorrain, was still older. Pope Clement XII. lived to the age of 80.

The north of Europe (as we have sufficiently evinced in our extract from the Russian bills of mortality for Pinsask), affords abundant instances of longevity. Yet Louisa Trexo, who died at 174 or 175, was an inhabitant of Cordova du Tucuman, in Spanish America; and it affords a striking proof of that country also being favourable to longevity, that at the time of her death there were several persons of 100 years old, and another negro woman of 120, who gave judicial testimony of her age. Our own country (which may be regarded in general climate and temperature as a medium between the two), affords, perhaps, as numerous instances as any. Mr. Carew, in his Survey of Cornwall, assures us, that it is no unusual thing with the inhabitants of that county to reach 90 years of age and upwards, and even to retain their strength of body and perfect use of their senses. Besides Brown, the Cornish beggar, who lived to 120, and one Polezew to 130 years of age, he remembered the decease of four persons in his own parish, the sum of whose years, taken collectively, amounted to 340. It is evident, therefore, that longevity is by no means confined to any particular nation or climate; nor are there wanting instances of it in almost every quarter of the globe, as appears from the preceding as well as the subsequent Table; which might have been considerably enlarged had it been necessary.

# LIFE.

| Names of the Persons. | Age. | Places of Abode. | Where recorded. |
|---|---|---|---|
| Hippocrates, Physician | 104 | Island of Cos. | Lynche on Health, chap. 3. |
| Democritus, Philosopher | 109 | Abdera. | Bacon's History, 1095. |
| Galen, Physician | 140 | Pergamus. | Voss. Instit. or lib. 3. |
| Albuna, Marc | 150 | Ethiopia. | Hakewell's Ap. lib. 1. |
| Dumitur Raduly | 140 | Haromszeck, Transylvania. | Died Jan. 18, 1782. Gen. Gazetteer, April 18th. |
| Titus Fullonius | 150 | Bononia. | Fulgosus, lib. 8. |
| Abraham Paiba | 142 | Charlestown, South-Caro. | General Gazetteer. |
| L. Tertulla | 137 | Arminium. | Bulgosus, lib. 8. |
| Lewis Cornaro | 100 | Venice. | Bacon's Hist. of Life, p. 134. |
| Robert Blakeney, Esq. | 114 | Armagh, Ireland. | General Gazetteer. |
| Margaret Scott | 125 | Dalkeith, Scotland. | Inscription on her Tomb there. |
| W. Gulstone | 140 | Ireland. | Fuller's Worthies. |
| J. Bright | 105 | Ludlow. | Lynche on Health. |
| William Postell | 120 | France. | Bacon's History, page 134. |
| Jane Reeves | 103 | Essex. | St. James's Chron. June 14, 1781. |
| W. Paulet, Marquis of Winchester | 106 | Hampshire. | Baker's Chron. p. 502. |
| John Wilson | 116 | Suffolk. | Gen. Gaz. Oct 10, 1782. |
| Patrick Wian | 117 | Lesbury, Northumberl. | Plemp. Fundammed, § 4. c. 8. |
| M. Laurence | 140 | Orcades. | Buchanan's Hist. of Scotland. |
| Evan Williams | 145 | Caermarthen work-house, still alive. | Gen. Gazetteer, Oct. 12, 1782. |
| John Jacobs * | 121 | Mount Jura. | All the public prints, Jan. 1790. |
| Matthew Tait † | 123 | Auchinlek, Airshire. | Died Feb. 19, 1792. Edin. Even. Cour. March 8, 1792. |
| Donald Macleod ‡ | 104 | Isle of Sky. Alive Jan. 1792. | All the public prints at the end of 1790; and Memoirs, &c. |

* This man, in 1789, at the age of 120, quitted his native hills, and from the summit of Mount Jurá undertook a journey to Versailles, to behold and return thanks to the National Assembly, for the vote which had freed him and his poor countrymen from the feudal yoke. In the early part of his life, he was a servant in the family of the Prince de Beaufremont. His memory continued good to the last day of his life; and the principal inconveniences which he felt from his great age were, that his sight was weakened, and the natural heat of his body was so diminished, that he shivered with cold in the middle of the dog-days if he was not sitting by a good fire. This old man was received in the body of the house by the National Assembly, indulged with a chair, and directed to keep on his hat lest he should catch cold if he were to sit uncovered. A collection was made for him by the members, which exceeded 500l. sterling; but he lived not to return to Mount Jura. He was buried on Saturday the 31st of January, 1790, with great funeral pomp, in the parish church of St. Eustace, at Paris.

† He served as a private at the taking of Gibraltar, in 1704.

‡ Memoirs of the Life and gallant Exploits of the Old Highlander, Serjeant Donald Macleod, &c. published Jan. 1791, in the 103d year of his age.—This old gentleman, for it appears that he really was a gentleman both by birth and by behaviour, was born in the year of the Revolution, in the parish of Bracadill, in the isle of Sky, and county of Inverness, North Briton. He was a cadet of the family of Ulinish, in Sky; and descended, through his mother, from Macdonald of Slate, the ancestor of the present Lord Macdonald. The earlier part of his life coincided with the famine of seven years in Scotland; which was so great as to suggest, even to the patriotic Mr. Fletcher, the idea of the people selling themselves as slaves for immediate subsistence. He was bred in the midst of want and hardships, cold, hunger, and for the years of his apprenticeship with a mason and stone-cutter in Inverness, in incessant fatigue. He enlisted, when a boy, in the Scottish service, in the town of Perth, in the last year of the reign of King William. The regiment into which he enlisted was the Scots Royals, commanded by the earl of Orkney. That old military corps, at that time, used bows and arrows as well as swords, and wore steel caps. He served in Germany and Flanders, under the duke of Marlborough; under the duke of Argyle, in the Rebellion, 1745; in the Highland Watch, or companies raised for enforcing the laws in the Highlands; in the same companies when, under the name of the 42d regiment, they were sent abroad to Flanders, to join the army under the duke of Cumberland; in the same regiment in Ireland, and on the breaking out of the French war, in 1757, in America. From the 42d he was draughted to act as a drill serjeant in the 78th regiment, in which he served at the reduction of Louisburg and Quebec: after this he became an out-pensioner of Chelsea Hospital. But such was the spirit of this brave and hardy veteran, that he served in 1761 as a volunteer in Germany, under the marquis of Granby; and offered his services in the American war to Sir Henry Clinton; who, though he declined to employ the old man in the fatigues and dangers of war, treated him with great kindness, allowed him a liberal weekly pension out of his own pocket, and sent him home in a ship charged with dispatches to government.—The serjeant, " as his memory, according to the observation of his biographer,

These examples are abundantly sufficient to prove, that longevity does not depend, so much as has been supposed, on any particular climate, situation, or occupation in life: for we see, that it often prevails in places where all these are extremely dissimilar; and it would, moreover, be very difficult, in the histories of the several persons above-mentioned, to find any circumstance common to them all, except, perhaps, that of being born of healthy parents, and of being inured to daily labour, temperance, and simplicity of diet. Among the inferior ranks of mankind, therefore, rather than among the sons of ease and luxury, shall we find the most numerous instances of longevity; even frequently, when other external circumstances seem extremely unfavourable: as in the case of the poor sexton at Peterborough, who, notwithstanding his unpromising occupation among dead bodies, lived long enough to bury two crowned heads, and to survive two complete generations. The livelihood of Henry Jenkins, and old Parr, is said to have consisted chiefly of the coarsest fare, as they depended on precarious alms. To which may be added, the remarkable instance of Agnes Milbourne, who, after bringing forth a numerous offspring, and being obliged, through extreme indigence, to pass the latter part of her life in St. Luke's work-house, yet reached her 106th year in that sordid and unfriendly situation. The plain diet and invigorating employments of a country life are acknowledged on all hands to be highly conducive to health and longevity, while the luxury and refinements of large cities are allowed to be equally destructive to the human species; and this consideration alone, perhaps, more than counterbalances all the boasted privileges of superior elegance and civilization resulting from a city life.

From country villages, and not from crowded cities, have the preceding instances of longevity been chiefly supplied. Accordingly it appears, from the London bills of mortality, during a period of 30 years, viz. from the year 1728 to 1758, the sum of the deaths amounted to 750,322, and that, in all this prodigious number, only 242 persons survived the 100th year of their age! This overgrown metropolis was long ago computed by Dr. Price to contain a ninth part of the inhabitants of England, and to consume annually 7000 persons, who remove into it from the country every year, without increasing it. He moreover observes, that the number of inhabitants in England and Wales, has diminished about one-fourth part since the Revolution; and so rapidly of late, that in 11 years, near 200,000 of our common people have been lost. If the calculation be just, however alarming it may appear in a national view, there is this consolation, when considered in a philosophical light, that without partial evil there can be no general good; and that what a nation loses in the scale of population at one period, it gains at another; and thus, probably, the average number of inhabitants on the surface of the globe continues at all times nearly the same. By this medium, the world is neither overstocked with inhabitants nor rendered too thin, but life and death keep a tolerably equal pace. The inhabitants of this island, comparatively speaking, are but as the dust of the balance; yet instead of being diminished, we are assured by other writers, that within these thirty years they are greatly increased.

The desire of self-preservation, and of protracting the short span of life, is so intimately interwoven with our constitution, that it is justly esteemed one of the first principles of our nature, and, in spite even of pain and misery, seldom quits us to the last moments of our existence. It seems, therefore, to be no less our duty than our interest, to examine minutely into the various means that have been considered as conducive to health and long life; and, if possible, to distinguish such circumstances as are essential to that great end from those which are merely accidental. But here it is much to be regretted, that an accurate history of the lives of all the remarkable persons in the above table, so far as relates to the diet, regimen, and the use of the non-naturals, has not been faithfully handed down to us; without which it is impossible to draw the necessary inferences. Is it not then a matter of astonishment, that historians and philosophers have hitherto paid so little attention to longevity? If the present imperfect list should excite others, of more leisure and better abilities, to undertake a full investigation of so interesting a subject, the inquiry might prove not only curious but highly useful to mankind. In order to furnish materials for a future history of longevity, the bills of mortality throughout the kingdom ought first to be revised, and put on a better footing, agreeable to the scheme of which Manchester and Chester have already given a specimen highly worthy of imitation. The plan, however, might be further improved with very little trouble, by adding a

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is impaired, does not pretend to make an exact enumeration of all his offspring; but he knows of sixteen sons now living, fourteen of whom are in the army and navy, besides daughters; the eldest of whom, by his present wife, is a mantua-maker in Newcastle. His eldest son is now 83 years old, and the youngest only nine. Nor, in all probability, would this lad close the rear of his immediate progeny, if his present wife, the boy's mother, had not attained to the 49th year of her age.—In his prime, he did not exceed five feet and seven inches. He is now inclined through age to five feet five inches. He has an interesting physiognomy, expressive of sincerity, sensibility, and manly courage. His biographer very properly submitted it to the consideration of the Polygraphic Society, whether they might not do a thing worthy of themselves and their ingenious art, if they should multiply likenesses of this living antiquity, and circulate them at an easy rate throughout Britain and Europe. They would thus gratify a very general curiosity; a curiosity not confined to the present age.

The following instance is given in a recent German Journal, but the name of the veteran is not mentioned: "There is now living, near Polosk, on the frontiers of Livonia, a Russian, who served under Gustavus Adolphus. He was present at the battle of Pultowa, in 1709, at which time he was 86 years of age. At the age of 93 he entered into the marriage state, and had children. The family of this patriarch consists of 186 individuals, who reside together in a village which comprehends ten houses: the oldest of his grand-children is 102. This old man still enjoys a perfect state of health, though now 180."

particular account of the diet and regimen of every person who dies at 80 years of age or upwards; and mentioning whether his parents were healthy, long-lived people, &c. An accurate register, thus established throughout the British dominions, would be productive of many important advantages to society, not only in a medical and philosophical, but also in a political and moral view.

All the circumstances that are most essentially necessary to life, may be comprised under the six following heads:

1. *Air and Climate.* It has long been known that fresh air is more immediately necessary to life than food; for a man may live two or three days without the latter, but not many minutes without the former. All climates almost give some instances of longevity; yet the majority of instances occur in cold and moderate climates. Heat relaxes and enfeebles, and the diet of hot countries is less nourishing than that of cold; while excesses are more generally indulged in.

2. *Parentage.* Being born of healthy parents, and exempted from hereditary disease, are circumstances evidently favourable to the duration of life; and numerous instances warrant the opinion, that longevity prevails in some families more than in others, or that descent from long-lived ancestors is one of the circumstances which give the greatest probability of attaining to extreme old age.

3. *Form and size of the individual.* It is generally admitted, that persons of a compact shape, and of a moderate stature, are the most likely to live long. Tall persons frequently acquire a habit of stooping, which contracts the chest, and is a great impediment to free respiration; whereas the short-sized find little difficulty in keeping themselves erect, and are naturally much more active, by which the animal functions are retained in a state of greater perfection; the only disadvantage attending a short stature is, that it is frequently accompanied with corpulence, which is rather unfavourable to long life.

4. *Disposition of Mind.* Nothing is more conducive to longevity than to preserve equanimity and good spirits, and not to sink under the disappointments of life, to which all, but particularly the old, are necessarily subjected. This is a point which cannot be too much inculcated, as experience continually shows that many perish from despondency, who, if they had preserved their spirits and vigour of mind, might have survived many years longer. Neither the irritable, who are agitated by trifles, nor the melancholy, who magnify the evils of life, can expect to live long. Even those who suffer their strength and spirits to be exhausted by severe study, or other mental exertions, seldom reach great age. In the list before referred to, of 1712 persons who lived about a century, Fontenelle (who did not quite reach 100 years), is the only author of any note; and his great age is ascribed to the tranquil ease of his temper, and that liveliness of spirits for which he was much distinguished. Among those who have devoted themselves to the study or practice of music, a profession which encourages cheerfulness of mind, instances of great age have been very frequent.

5. *Occupation.* No person that leads an idle life will ever attain to great age; but health and long life must depend much on the manner in which the individual is employed. Those occupations are certainly the most conducive to the duration of life, which are carried on in the open air, and require activity or labour; thus farmers, gardeners, and labourers in the country, are in general the longest lived. Foot soldiers also, who have survived the dangers of war, are remarkable for long life: they are generally stout and vigorous men, and the regularity to which surviving soldiers must have accustomed themselves, whilst their careless and disorderly companions have dropped off, the erect posture to which they have been trained, and being of course men well formed by nature, and habituated to walk well (by which they enjoy the most natural exercise in perfection), all combine in their favour. Sailors also would furnish many instances of longevity if comfortably provided for in their old age: of this a striking proof is given in the accounts drawn up by Dr. Robertson, of the pensioners in Greenwich Hospital. In the year 1801, the complement of in-pensioners was 2410; of whom there were 96 of the age of 80 years and upwards; of this number 13 were above 90 years of age, and one man 102 years old. The number of out-pensioners was about 2500, of whom it appeared there were only 23 from 80 years of age and upwards. Of the former, therefore, about 4 in 100 survived 80 years of age, but of the latter not 1 in 100 attained that age, a sufficient evidence of the benefits of regularity and ease in the advanced period of life, and of the attention paid to the health of the in-pensioners at that excellent institution.

6. *Mode of Living.* If persons were to live with the simplicity of ancient times, it is probable that they would attain long life, without experiencing any material illness, merely by a proper attention to air, exercise, clothing, and diet. But in the present state of society, the great bulk of the community follow, not a natural, but an artificial mode of life, and thence are perpetually exposed to various temptations, which they find it difficult always to resist, and to dangers which they cannot always avoid. Most persons, however, have it in their power in some degree to regulate their manner of living by their own choice; and by a little attention to their food, clothing, employment, rest, and temper of mind, might not only contribute materially to the prolongation of their lives, but preserve themselves from many diseases, and greatly increase their relish for all the enjoyments of life.

The importance of wholesome food, for the preservation of health and promoting long life, and the avoiding of excess, whether in eating or drinking, is sufficiently obvious. Some instances, indeed, are recorded of persons who have continued to commit excesses, and have lived long; but these are to be considered in no other light than as exceptions to a general rule; and it may reasonably be contended, that if such persons lived to a great age, notwithstanding their intemperance, they would have lived much longer had they followed a different course. Experience will point out those articles of food which are best adapted to the constitution of each individual, and there cannot be a better rule than to adhere to them as far as circumstances will permit. It may be observed, however, that people in general, especially those who do not labour, eat much more than nature requires; that a little abstinence or self-denial may often be of use, either to prevent or to cure disease; and at

any rate, that none but hard-working people, the young who are growing fast, or persons who are travelling about, should eat more than one full meal each day.

As to clothing, much must depend on situation and climate; but it is generally found a useful practice to wear woollens next the skin. It is remarked in many parts of Scotland, that since the use of flannel shirts has been given up by the lower orders, the rheumatism and other diseases formerly unknown, have become very frequent, and are daily increasing. In the West India islands, if care be taken to make the troops wear flannel shirts, they are generally exempt from various disorders, which otherwise would probably have attacked them. Even the negroes themselves are said to prefer flannel to cotton or linen, and find it a much more comfortable and useful dress.

Exercise cannot be too much recommended; and as the inhabitants of large towns, and persons engaged in sedentary occupations, cannot take all the exercise abroad that may be necessary for their health, they ought as much as possible to accustom themselves to be walking about even in their own house, for though this practice does not make up for the want of exercise abroad, it is certainly the best substitute for it. Exercise is attended with the advantage of creating an inclination to retire early to rest, and of inducing sound sleep. Every one should take all the repose that nature requires, but should never continue long in bed without sleeping. Early rising, even if carried to an extreme, is far more conducive to health and long life, than late hours at night and slumbering in bed in the morning.

There is nothing that can tend more to long life, than for a person to obtain a complete command of his passions, and in particular to preserve his mind from being ruffled by the occurrences of life. Perhaps there is no maxim more likely to promote good health, and consequently the duration of life, than that of paying a proper attention to temper, temperance, and sleep. By good temper the mind is preserved from disease; and by temperance, the body; and both the mind and the body, when exhausted, are again recruited and restored to their former strength, by a sufficient quantity of repose.

*Proportion of Males born to Females born.* In contemplating the origin and duration of human life, there are two very striking facts, which hitherto remain altogether unaccounted for; and have, indeed, attracted less attention than they ought to do. The first is, that the birth of male children is considerably more numerous than that of female: upon the calculation of Derham, in the proportion of 14 to 13; a calculation which we cannot but regard as pretty correct, since it has more recently been confirmed by the observations of Muret, Susmilch, Dr. Price, and Dr. Haygarth. The second extraordinary fact is, that notwithstanding this superiority of births in males, the number of living females is considerably greater than that of males, in an average proportion of the different stages of life. It has been said by some writers, to be so in *every* stage, but this we shall presently point out to be an error.

These extraordinary facts seem, at first sight, to oppose each other. Mr. Derham, with more piety perhaps than judgment, ascribed the former of them to the provident care of the Deity, in order to allow a sufficient surplus for the waste and expenditure of warfare: as though the Deity himself gave a sanction to the wrath and savage contests of man, by an express law of nature. The latter has been brought forward to prove a greater tenacity to life in the female than in the male form; and some physiologists have advanced so far as to conceive, that this greater tenacity to life in females exists not only through every stage after birth, but even before birth itself; in corroboration of which the tables of Mr. Kerseboom have been adverted to, which seem to determine that the still-born males, and those necessarily injured in birth, are as the still-born and injured females in the proportion of three to two. Now this reasoning is not only in diametrical opposition to the preceding, but in our opinion just as fallacious. As the subject, however, is of the highest importance, and nevertheless has scarcely been touched upon with a view of any fair elucidation, by any writer, we shall encroach upon an additional page, in order to harmonize the whole, and reduce the various facts to one common and simple principle. In doing which, we shall first beg the reader's attention to the following extract, from a valuable, and we believe highly accurate table of average male and female life, upon a scale of 10,000, introduced by Mr. Baily, from the national tables of Sweden, into his "Doctrine of Life Annuities." Any other table of a similar kind would answer our purpose as well, but we take this as being one of the latest, and most immediately at hand.

| | MALES. | | FEMALES. | |
|---|---|---|---|---|
| Age. | Living. | Dying. | Living. | Dying. |
| 0 | 10,000 | 2,300 | 10,000 | 2,090 |
| 1 | 7,700 | 500 | 7,910 | 518 |
| 10 | 6,013 | 55 | 6,217 | 52 |
| 15 | 5,788 | 39 | 6,009 | 35 |
| 16 | 5,749 | 39 | 5,974 | 40 |
| 17 | 5,710 | 39 | 5,934 | 40 |
| 18 | 5,671 | 44 | 5,894 | 42 |
| 20 | 5,583 | 50 | 5,809 | 43 |
| 21 | 5,593 | 50 | 5,766 | 43 |
| 50 | 3,666 | 95 | 4,027 | 75 |
| 70 | 1,541 | 120 | 1,979 | 130 |
| 90 | 38 | 12 | 58 | 15 |
| 95 | 1 | 1 | 7 | 4 |

Admitting the fact of a greater proportion of males born into the world than of females, before we can assign any physical cause for such a fact, it is first of all necessary for us to enquire what is the law that in any time and in any instance, regulates and determines the sexual difference in generation or conception?

In the article Generation we have given a rapid glance at the chief theories which have been offered upon this subject; and have observed that the theory of *epigenesis* or that which supposes production to result from elementary matter furnished by *both* the parents, a theory first started by Epicurus, and since restarted by Buffon, is the only theory that will

stand the test of a rational investigation. The fetus hence, then, originating, it was the opinion of the Grecian founder of this doctrine, and an opinion which is at least plausible, that the sexual distinction was stamped by the party evincing the greatest degree of orgasm during connexion; and as from the superior muscularity and salacity of man to that of woman, we have reason to conjecture that a somewhat greater portion of organ must usually lie with the former, we have reason to conjecture even *à priori* that the greater number of fetuses will be of the male sex. This doctrine is thus elegantly and accurately laid down by Lucretius, iv. 1202.

> Et conmiscendo quom semine forte virili
> Femina vim vicit subitâ vi, conripuitque;
> Tum similes matrum materno semine fiunt:
> Ut patribus patrio.

We may hence give a probable guess, why, from the common laws of nature, the male births should in some degree exceed the female.

But the principle which thus operates *ab initio*, should continue to operate *in futuro*, and the male form produced by a somewhat superior degree of vigour, should in general evince more vigour through the different stages of life, be better able to ward off the dangers that threaten it, and of course (in opposition to the common opinion upon this subject) discover a greater tenacity to life, under equal circumstances, than females.

Now this we believe they do; and we may safely appeal to the preceding table in support of such an assertion. By this table it will be found that the average death of females for the second and third years keeps nearly on a par with that of males, and upon the whole rather exceeds it. As boys for the most part now begin to be more exposed to external air and external accidents than girls, the dangers hence derived make the number of deaths from this period greater among the former than among the latter. And the same exposure to casualties continuing, the same proportion of deaths still prevail, till the period of puberty; when, the change which takes place in the female form being of a more trying character than what occurs in the male: the deaths are again reduced very nearly to a balance. But majority being now acquired on both sides, more males will again be found to fall victims than females, in given numbers and given ages, from the more extensive range and complexity of the casualties, to which males are still subject; and which produces an extra-mortality, more than sufficient to counterbalance that which takes place among females, from child-bearing. As old age however supervenes, the male is again brought back to an equality of exemption from external casualties from the feebleness which prevents him from being any longer able to brave them; and here we again see an equality of deaths restored between the two; at the age of 70 the males deaths out of 1541 being 120, and the females deaths out of 1979 being 130; while at 90, the former, out of 38 are 12, and the latter out of 58, are 15. If the assertion be true that more still born and injured male children are brought forth than female (which however is by no means to be fully depended upon) it may possibly be accounted for upon the same principle. Generally speaking the weakliest women are those that are most deformed; and both the weakly and the deformed are those from whom we should rather expect male than female children, upon the hypothesis assumed above. If then the stoutest and most vigorous children be the males, such have the greatest chance of being injured in labour as well from the superior delicacy as the deformity of the mother, in consequence of the superiority of their size, and the greater difficulty in their passage into the world.

Upon the whole, man, as Haller has long since observed in his physiology, has no right to complain of the shortness of life. Throughout the whole of living beings there are a few who unite in a greater degree all the internal causes which tend to prolong its different periods. The term of gestation is very considerable; the rudiments of the teeth are very late in unfolding; his growth is slow, and is not completed before about twenty years have elapsed. The age of puberty also is much later in man than in any other animal. In short the parts of his body, being composed of a softer and more flexible substance, are not so soon hardened as those of inferior animals. Man therefore seems to receive at his birth the seeds of a long life: and if he reach not in general the distant period which nature appears promise him, it is owing to accidental causes foreign to himself. Instead of saying that his life is completed we ought rather to say that it was cut off.

In few words, the natural and total duration of life, whether of animals or vegetables, is in a considerable degree proportioned to the period of youth. A tree or a quadruped that soon acquires its full size, decays much sooner than another which continues to grow for a longer time.

Among plants, some species of boletus, like some species of insects, require only a few hours to unfold themselves, and as soon decay. Several fungi live only a few days, others a few weeks and months. Annual plants live three, four, or at the utmost eight months: biennial plants sixteen, eighteen, and even four-and-twenty months. Many herbaceous plants grow a few years only, but more a long series of years: while shrubs and trees in some instances live eight, ten, a hundred, or even a thousand years. With us the oak and lime-tree attain the greatest longevity: but these are nothing to the longevity of the adansonia digitata, the pinus cedrus, or the general family of palms: the first of which, though its stem is usually not more than ten or twelve feet high, measures from 75 to 90 feet in circumference, sends off branches from its top in every direction of from thirty to sixty feet in length; takes several centuries in acquiring perfection, and (according to the general computation) is a thousand years before it decays.

The same observation will more strictly apply to animals in general. Of man we shall add nothing farther. The life of fishes we know but little of, from their existing in a different element than our own; yet we know that while the salmon, which grows rapidly, takes only about six years to reach its full size, and seldom or never exceeds from twenty-four to thirty years in its life; the carp, which grows more tardily, and to almost any extent (having been occasionally found five feet long, and two hundred pounds in weight) has been fairly ascertained a century old; and been seen, according to Mr. Reinhold, Foster in a group of from two to three hundred,

at Cherlothenburg, a Prussian palace, the common age of which was from fifty to sixty years.

Among quadrupeds, the longest lived is the elephant; but this is also the quadruped that is longest in acquiring its full growth. Among birds, the swan requires forty-two days for its incubation; and the parrot forty; and these are the birds of the greatest longevity we are acquainted with. The crow or raven, the goose and eagle, have also a reputation for great longevity; but it is a reputation founded on doubtful authority. We shall subjoin a table of the comparative ages of the most common quadrupeds and birds, together with the periods of their incubation or gestation, as a datum from which many naturalists, but perhaps erroneously, calculate. We take it from *Tilloch's Philos. Mag.* xii. 245. copied from Count Moronzo to C. Laçepede:

QUADRUPEDS.

| Names of Animals. | Gestation. | Duration of Life. | Authors. |
|---|---|---|---|
| | Months | Years. | |
| Elephant | 24 | 150 to 200 | Aristotle. |
| Camel | 12 | 40 — 50 | The same. |
| Buffalo | 12 | 20 — 25 | Cajetuno. |
| Ass | 12 | 25 — 30 | Buffon. |
| Mare | 11 ½ | 25 — 30 | Aristotle. |
| Cow | 9 | 14 — 15 | The same. |
| Stag | 8 ½ | 35 — 40 | New Treatise on Hunting. |
| Roe-buck | 5 ½ | 12 — 15 | Buffon. |
| Sheep | 5 | 12 — 15 | The same. |
| Goat | 5 | 11 — 13 | The same. |
| Dog | 2 | 11 — 15 | The same. |

BIRDS.

| Names of Birds. | Incubation. | Duration of Life. | Authors. |
|---|---|---|---|
| | Days. | Years. | |
| Swan | 42 | 200 nearly | Aldrovandi. |
| Parrot | 42 | 100 nearly | Wolmaer. |
| Goose | 30 | 80 and more | Willoughby. |
| Eagle | 30 | Never observed accurately. | |
| Bastard | 30 | | |
| Duck | 30 | | |
| Turkey | 30 | | |
| Peacock | 26 to 27 | 25 to 28 | Aristotle. Pliny. |
| Pheasant | 20 — 25 | 18 — 20 | Treatise on Pheasants. |
| Crow | 20 | 100 and more | Hesiod. |
| Nightingale | 19 — 20 | 17 to 18 | Buffon. |
| Pullet | 18 — 19 | 16 — 18 | Buffon. |
| Pigeon | 17 — 18 | 16 — 17 | Several Observations, &c. |
| Linnet | 14 | 13 — 14 | Willoughby. |
| Canary-Bird | 13 — 14 | 13 — 14 | Treatise on Canary Birds. |
| Goldfinch | 13 — 14 | 18 — 20 | Buffon. |

2. *Duration of Life considered politically.*

A knowledge of the common term of human life, in conjunction with that of a definite climate, of the facility or difficulty of subsistence, and the actual population at a given period, will hence be found a fair datum to calculate, from one era, the regular increase or diminution that may rationally be expected to take place at another. It will also enable us to calculate the value of an individual life, so as to make important adjustments in many pecuniary concerns.

The mortality of mankind is, indeed, a subject of interesting speculation, not only to the moralist and divine, but to the politician and philosopher. The physical and political uses of this kind of speculation, have been long since pointed out by Sir William Petty, in his "Natural and Political Observations on the Bills of

Mortality of London." But the inquiry has, moreover, led to the creation of a distinct branch of analytical science,—that, we mean, which relates to the valuation of *life annuities* and *assurances*. See ASSURANCES and the article immediately following.

LIFE ANNUITIES, are such periodical payments as depend on the continuance of some particular life or lives. They may be distinguished into annuities that commence immediately, and such as commence at some future period, called *reversionary life annuities.*

The species of mathematical investigation which leads to the determination of life annuities and assurances, is perfectly modern, and in fact, may be called new: for we find scarcely any traces of it before the commencement of the last century. Van Hudden was the first who attempted the developement of a rational theory; and this was still further expanded by the celebrated pensionary John de Witt, in a tract printed at the Hague in 1671, under the title "De vardye van de Lif-renten na proportie van de Losrenten." Nothing, however, to which a reader of the present times could recur with advantage, was produced till 1692-3; when Dr. Halley, whose labours so greatly enriched almost every department of mathematical knowledge, gave, in the Philosophical Transactions, "An Estimate of the Degrees of Mortality of Mankind, drawn from curious tables of the births and funerals at the city of Breslaw; with an attempt to ascertain the price of annuities on lives." In this paper Dr. Halley presented a very perspicuous view of the principles on which an accurate theory of assurances and annuities must rest, and from the application of these principles to the Breslaw observations, deduced the first correct table of the value of life annuities. De Moivre took up the subject where Halley left it, and in 1724 published the first edition of his "Annuities on Lives." In this very ingenious and valuable work, he started the hypothesis that "the decrements of life are equal and uniform, from birth to the utmost extremity of human life;" an hypothesis which, though it much simplifies computation, and furnishes a very elegant theory, considered merely in relation to its analytical symmetry, and facility of practice, yet when applied to such cases as actually occur, often leads to results extremely erroneous, unless it be subjected to the checks furnished by other theories. In 1742 another excellent mathematician, Mr. T. Simpson of the Woolwich academy, in a curious little treatise "On the Doctrine of Annuities and Reversions," clearly explained the method of computing the value of annuities, &c. from the real observations of life—an improvement certainly of great importance—and prosecuted the subject still farther in his "Select Exercises," published in 1752. In 1753 and 1755 Mr. James Dodson published the second and third volumes of his "Mathematical Repository," in which he has given the most extensive collection extant of problems purely algebraical, and solved an immense variety of questions relative to annuities, reversions, survivorships, and assurances; though, unfortunately, he has throughout adopted the hypothesis of his friend M. de Moivre.

The science remained in this state, without much improvement, till the publication of the first edition of Dr. Price's celebrated treatise in 1769. This work, entitled "Observations on Reversionary Payments, &c." was first published with a view to oppose and destroy the injurious effects and evil intentions of a class of men (unfortunately to be found in every stage of society) who, under pretence of establishing societies for the benefit of old age, and of widows, were only forming schemes to allure and to defeat the hopes of the ignorant and the distressed. His efforts were eventually crowned with success: and those bubble societies have long since met with the fate which he so truly predicted.

In this laudable pursuit, Dr. Price saw the necessity of more accurate observations on the mortality of human life; in order to determine with more correctness the value of life annuities, and to show more forcibly the futility and extravagance of the schemes that were issued by those societies. By the assistance of some public-spirited individuals, he obtained correct registers of the rate of mortality at Northampton, Norwich, Chester, and other places in England. But still, the computation of the values of annuities, according to these observations, was a work so tedious and unpleasant, that little hopes were entertained of profiting by those researches: and Dr. Price suffered three several editions of his treatise to pass over without affording any additional information on this subject. At length the fourth edition appeared (1783) enriched with several valuable tables of annuities on single and joint lives, at different rates of interest, deduced not only from the probabilities of living as observed at Northampton, but also from the probabilities of living as observed in the kingdom of Sweden at large.

The great addition which Dr. Price has made to our means of information respecting this science, and the assiduity with which he thus promoted some of the best interests of mankind, deserves the highest commendation: and his labours on this subject entitle him to our warmest praise. The primary object which he had in view, has been fully answered; and his treatise was admirably adapted to that end. In every other respect, however, it is far from being complete: and the reader will look in vain for the most common cases that occur in practice. Indeed, those subjects which are to be met with, do not readily present themselves; owing to the loose and irregular manner in which they are treated. Dr. Price's object was not so much to insert what was new, as to illustrate (by some striking examples) a few of the leading problems, with a view to oppose the pernicious schemes that disgraced the age in which he lived. But, those schemes having long since vanished, his observations may now be considered rather as a beacon to posterity.

The next treatise on this subject is that by Mr. Morgan, entitled "The Doctrine of Annuities and Assurances," which appeared in 1779. This author sets out with the vain attempt to render the principles of the science intelligible to persons unacquainted with mathematics: but, after a fruitless effort for this purpose, he ultimately leaves his readers to pursue their inquiries by the common and only useful method of analysis. Besides some valuable observations "on the different methods of determining the state of a society, whose business consists in making assurances on lives," that work will be found to contain a variety of problems, treated for the most part in a plain, easy and familiar manner; and adapted to the state of the science at that period.

But, out of the forty-two problems which that treatise contains, about thirty of them, chiefly relating to contingent annuities and assurances, are (owing to more accurate observations and a more improved analysis) now rendered totally unfit for general use. Mr. Morgan himself, however, has been the principal cause of this revolution in the science.

The next professed treatise on the science is Mr. Baron Maseres's "Principles of the Doctrine of Life Annuities" (1783): wherein this celebrated author has explained the subject in so familiar a manner, as to be intelligible even to those who are unacquainted with the doctrine of chances, and who have made no great proficiency in mathematics. This treatise, however, although consisting of more than 700 quarto pages) goes no further, in the analysis of the subject, than the first two problems in the present work: but its value is greatly enhanced by containing a variety of new tables of the value of annuities on single lives, and on two joint lives of different ages, deduced from the probabilities of living as observed by M. De Parcieux among the government annuitants in France; these being justly considered by the learned author as the most proper data whereon to found the value of life annuities. There are, moreover, in that treatise several interesting observations on the best method of providing annuities for old age, and on various subjects of finance and political economy; which render it particularly valuable to those who are desirous of information on these important questions, and will perpetuate the name and abilities of this truly public-spirited writer.

Soon after the publication of the fourth edition of Dr. Price's "Observations on Reversionary Payments" (which contained the valuable collection of tables of life annuities, deduced from the observations made at Northampton and in Sweden), Mr. Morgan was enabled to detect the inaccuracy of those rules which, not only Mr. Simpson and others had given for determining the value of contingent annuities and assurances, but also which he himself had deduced from the same principles, in his treatise above mentioned: and he immediately set about to correct them. His labours, on this subject, are contained in the several papers inserted by him in the *Philosophical Transactions* for 1788, 1789, 1791, 1794, and 1800. In the first volume, here alluded to, he has considered those cases only in which two lives are concerned: in the next two volumes, his object was to deduce the value of contingent assurances in all those cases where three lives are concerned, and which admit of a correct answer: and in the last two volumes he proposed to determine the value of contingent annuities and assurances in all the remaining cases of three lives.

Whoever will take the pains to read over those papers with attention, must be struck with surprise and regret at the strange and confused manner which Mr. Morgan has pursued, in order to obtain the solution of the several problems under consideration. No one, at the present advanced state of the science (with so many models of simplicity and elegance before him), could expect to see any mathematical inquiries conducted in so loose, so obscure, so extraordinary a manner. The investigations are tediously and unnecessarily prolix; crowded with useless repetitions, and a variety of unmeaning quantities. All which might indeed be excused, if the resulting formulæ had been at once simple and correct: instead of which, we find the grossest errors committed, not only as to their form, but as to their accuracy. They are, for the most part, unnecessarily long; abounding with useless quantities (which render their numerical solution exceedingly intricate and difficult), and oftentimes at variance with the particulars mentioned in the investigation; which, together with the erroneous manner in which they are printed, renders them of little or no use to the public. Most of his problems are investigated in two different ways, and are solved by means of two distinct formulæ: but, notwithstanding the similarity of these methods is studiously kept from the observation of the reader, and although these double formulæ are in each problem totally different in appearance, yet they will be found in all cases to be precisely the same, disguised under different symbols! A curious and interesting branch of the science has been thus strangely distorted and enveloped in mystery; a depraved taste in mathematical reasoning has been introduced, and (what is by far of the greatest importance) many false solutions have probably resulted from too great a dependence on the general formulæ.

Some foreigners, as Bernoulli, Gregory Fontana, Kerseboom, Duvillard, Deparcieux, Crome, Sprengell, &c. have attended to some of the insulated branches of this subject. But there were no works which deserved the name of treatises, except the above, till the commencement of the present year, when Mr. Francis Baily published a very complete and valuable work, entitled "The Doctrine of Life Annuities and Assurances analytically investigated and explained." In this performance the arrangement of the author is logical; his demonstrations as perspicuous as the nature of the subject will allow: the new notation by which he simplifies his theoretical processes is ingenious; and the numerous practical rules which he has deduced from his investigations are plain and free from ambiguity. He has carefully guarded against a loose and unscientific use of terms; and has so contrived the subdivisions of his work, as to keep himself tolerably free from needless repetitions. The tables which are in number 59, and occupy 100 pages, are neatly, and (as far as we may venture to speak from a pretty cautious inspection) accurately printed. We therefore think it our duty to recommend Mr. Baily's treatise to such of our readers as wish to investigate this interesting subject minutely: others may be satisfied with the following tables and remarks.

The value or present worth of an annuity for any proposed life or lives, it is evident, depends on two circumstances; the interest of the money, and the chance or expectation of the continuance of life. Upon the former only depends the value or present worth of an annuity certain, or that is not subject to the continuance of a life, or other contingency; but the expectation of life being a thing not certain, but only possessing a certain *chance*, it is evident that the value of the certain annuity, as stated above, must be diminished in proportion as the expectancy is below certainty: thus, if the present value of an annuity certain be any sum, as suppose 100l. and the value and expectancy of the life be $\frac{1}{2}$, then the value of the life annuity will be only half of

the former, or 50l.; and if the value of the life be only $\frac{1}{3}$, the value of the life annuity will be but $\frac{1}{3}$ of 100l. that is 33l. 6s. 8d.; and so on.

The measure of the value or expectancy of life, depends on the proportion of the number of persons that die, out of a given number, in the time proposed; thus if 50 persons die, out of 100, in any proposed time, then, half the number only remaining alive, any one person has an equal chance to live or die in that time, or the value of his life for that time is $\frac{1}{2}$; but if $\frac{2}{3}$ of the number die in the time proposed, or only $\frac{1}{3}$ remain alive, then the value of one's life is $\frac{1}{3}$; and if $\frac{3}{4}$ of the number die, or only $\frac{1}{4}$ remain alive, then the value of any life is but $\frac{1}{4}$; and so on. In these proportions then must the value of the annuity certain be diminished, to give the value of the like life annuity.

It is plain, therefore, that in this business it is necessary to know the value of life at all the different ages, from some table of observations on the mortality of mankind, which may shew the proportion of the persons living, out of a given number, at the end of any proposed time; or from some certain hypothesis, or assumed principle. Now various tables and hypotheses of this sort were given by the writers on this subject: but the same table of probabilities of life will not suit all places; for long experience has shewn that all places are not equally healthy, or that the proportion of the number of persons that die annually, is different for different places. It may not therefore be improper to insert here a comparative view of the principal tables that have been given of this kind, as below, where the first column shews the age, and the other columns the number of persons living at that age, out of 1000 born, or of the age 0, in the first line of each column.

# LIFE ANNUITIES.

## TABLE I.

*Shewing the Number of Persons living at all Ages, out of* 1000 *that had been born at several Places, viz.*

| Ages | Vienna. | Berlin. | London. | Norwich. | Northampton. | Breslaw. | Brandenburg. | Holy-Cross. | Holland. | France. | Vaud, Switzerland. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| 1 | 542 | 633 | 680 | 798 | 738 | 769 | 775 | 882 | 804 | 805 | 811 |
| 2 | 471 | 528 | 548 | 651 | 628 | 658 | 718 | 762 | 768 | 777 | 765 |
| 3 | 430 | 485 | 492 | 595 | 585 | 614 | 687 | 717 | 736 | 750 | 735 |
| 4 | 400 | 434 | 452 | 566 | 562 | 585 | 664 | 682 | 709 | 727 | 715 |
| 5 | 377 | 403 | 426 | 544 | 544 | 563 | 642 | 659 | 689 | 711 | 701 |
| 6 | 357 | 387 | 410 | 526 | 530 | 546 | 622 | 636 | 676 | 697 | 688 |
| 7 | 344 | 376 | 397 | 511 | 518 | 532 | 607 | 618 | 664 | 686 | 677 |
| 8 | 337 | 367 | 388 | 500 | 510 | 523 | 595 | 604 | 652 | 676 | 667 |
| 9 | 331 | 361 | 380 | 490 | 504 | 515 | 585 | 595 | 646 | 667 | 659 |
| 10 | 326 | 356 | 373 | 481 | 498 | 508 | 577 | 589 | 639 | 660 | 653 |
| 11 | 322 | 353 | 367 | 474 | 493 | 502 | 570 | 585 | 633 | 654 | 648 |
| 12 | 318 | 350 | 361 | 469 | 488 | 497 | 564 | 581 | 627 | 649 | 643 |
| 13 | 314 | 347 | 356 | 464 | 484 | 492 | 559 | 577 | 621 | 644 | 639 |
| 14 | 310 | 344 | 351 | 460 | 480 | 488 | 554 | 573 | 616 | 639 | 635 |
| 15 | 306 | 341 | 347 | 455 | 475 | 483 | 549 | 569 | 611 | 635 | 631 |
| 16 | 302 | 338 | 343 | 451 | 470 | 479 | 544 | 565 | 606 | 631 | 626 |
| 17 | 299 | 335 | 338 | 446 | 465 | 474 | 539 | 560 | 601 | 626 | 622 |
| 18 | 295 | 332 | 334 | 442 | 459 | 470 | 535 | 555 | 596 | 621 | 618 |
| 19 | 291 | 328 | 329 | 437 | 453 | 465 | 531 | 550 | 590 | 616 | 614 |
| 20 | 287 | 324 | 325 | 432 | 447 | 461 | 527 | 545 | 584 | 610 | 610 |
| 21 | 284 | 320 | 321 | 426 | 440 | 456 | 522 | 539 | 577 | 604 | 606 |
| 22 | 280 | 315 | 316 | 421 | 433 | 451 | 517 | 532 | 571 | 598 | 602 |
| 23 | 276 | 310 | 310 | 415 | 426 | 446 | 512 | 525 | 566 | 592 | 597 |
| 24 | 273 | 305 | 305 | 409 | 419 | 441 | 507 | 518 | 559 | 586 | 592 |
| 25 | 269 | 297 | 299 | 404 | 412 | 436 | 502 | 512 | 551 | 580 | 587 |
| 26 | 265 | 293 | 294 | 398 | 405 | 431 | 498 | 506 | 543 | 574 | 582 |
| 27 | 261 | 287 | 288 | 392 | 398 | 426 | 495 | 501 | 535 | 568 | 577 |
| 28 | 256 | 281 | 283 | 385 | 391 | 421 | 492 | 496 | 526 | 562 | 572 |
| 29 | 251 | 275 | 278 | 378 | 384 | 415 | 489 | 491 | 517 | 556 | 567 |
| 30 | 247 | 269 | 272 | 372 | 378 | 409 | 486 | 486 | 508 | 550 | 563 |
| 31 | 243 | 264 | 266 | 366 | 372 | 403 | 482 | 481 | 499 | 544 | 558 |
| 32 | 239 | 259 | 260 | 361 | 366 | 397 | 477 | 476 | 490 | 438 | 553 |
| 33 | 235 | 254 | 254 | 355 | 360 | 391 | 472 | 471 | 482 | 532 | 548 |
| 34 | 231 | 249 | 248 | 350 | 354 | 384 | 467 | 466 | 474 | 526 | 544 |
| 35 | 226 | 243 | 242 | 344 | 348 | 377 | 462 | 460 | 467 | 520 | 539 |
| 36 | 221 | 237 | 236 | 338 | 342 | 370 | 456 | 454 | 460 | 514 | 533 |
| 37 | 216 | 230 | 230 | 333 | 336 | 363 | 450 | 447 | 453 | 508 | 527 |
| 38 | 211 | 223 | 224 | 327 | 330 | 356 | 444 | 440 | 446 | 503 | 520 |
| 39 | 205 | 216 | 218 | 322 | 324 | 349 | 438 | 433 | 439 | 497 | 513 |
| 40 | 199 | 209 | 214 | 317 | 317 | 342 | 432 | 426 | 432 | 492 | 506 |
| 41 | 194 | 203 | 207 | 311 | 310 | 335 | 427 | 418 | 425 | 487 | 500 |
| 42 | 189 | 197 | 201 | 306 | 303 | 328 | 422 | 410 | 419 | 482 | 494 |
| 43 | 185 | 192 | 194 | 300 | 296 | 321 | 417 | 401 | 413 | 476 | 488 |
| 44 | 181 | 187 | 187 | 294 | 289 | 314 | 412 | 393 | 407 | 471 | 482 |
| 45 | 176 | 182 | 180 | 287 | 282 | 307 | 407 | 386 | 400 | 466 | 476 |
| 46 | 171 | 177 | 174 | 281 | 275 | 299 | 400 | 379 | 393 | 460 | 469 |
| 47 | 165 | 172 | 167 | 274 | 268 | 291 | 394 | 372 | 386 | 455 | 461 |
| 48 | 159 | 167 | 159 | 268 | 261 | 283 | 388 | 365 | 378 | 449 | 451 |
| 49 | 153 | 162 | 153 | 261 | 254 | 275 | 381 | 359 | 370 | 443 | 441 |
| 50 | 147 | 157 | 147 | 255 | 247 | 267 | 374 | 353 | 362 | 436 | 431 |
| 51 | 142 | 152 | 141 | 248 | 239 | 259 | 367 | 347 | 354 | 429 | 422 |
| 52 | 137 | 147 | 135 | 242 | 232 | 250 | 359 | 340 | 345 | 422 | 414 |
| 53 | 133 | 142 | 130 | 235 | 225 | 241 | 351 | 333 | 336 | 414 | 406 |

| Ages | Vienna. | Berlin. | London. | Norwich. | Northampton. | Breslaw. | Brandenburg. | Holy-Cross. | Holland. | France. | Vaud, Switzerland. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 54 | 128 | 137 | 125 | 228 | 218 | 232 | 343 | 326 | 327 | 406 | 397 |
| 55 | 123 | 132 | 120 | 221 | 211 | 224 | 334 | 318 | 318 | 397 | 388 |
| 56 | 117 | 127 | 116 | 213 | 204 | 216 | 324 | 310 | 309 | 388 | 377 |
| 57 | 111 | 121 | 111 | 206 | 197 | 209 | 314 | 301 | 300 | 379 | 364 |
| 58 | 106 | 115 | 106 | 199 | 190 | 201 | 304 | 292 | 291 | 369 | 348 |
| 59 | 101 | 109 | 101 | 191 | 183 | 193 | 293 | 283 | 282 | 359 | 331 |
| 60 | 96 | 103 | 96 | 184 | 176 | 186 | 282 | 273 | 273 | 349 | 314 |
| 61 | 91 | 97 | 92 | 177 | 169 | 178 | 271 | 263 | 264 | 339 | 299 |
| 62 | 87 | 92 | 87 | 169 | 162 | 170 | 260 | 253 | 255 | 329 | 286 |
| 63 | 82 | 88 | 83 | 161 | 155 | 163 | 248 | 243 | 245 | 318 | 274 |
| 64 | 77 | 84 | 78 | 153 | 148 | 155 | 236 | 233 | 235 | 307 | 262 |
| 65 | 72 | 80 | 74 | 144 | 141 | 147 | 224 | 223 | 225 | 296 | 250 |
| 66 | 67 | 75 | 70 | 136 | 134 | 140 | 213 | 213 | 215 | 285 | 236 |
| 67 | 62 | 70 | 65 | 128 | 127 | 132 | 202 | 203 | 205 | 273 | 220 |
| 68 | 57 | 65 | 61 | 119 | 120 | 124 | 190 | 193 | 195 | 260 | 202 |
| 69 | 52 | 60 | 56 | 111 | 113 | 117 | 178 | 182 | 185 | 246 | 184 |
| 70 | 48 | 55 | 52 | 103 | 106 | 109 | 166 | 171 | 175 | 232 | 168 |
| 71 | 44 | 51 | 47 | 94 | 99 | 101 | 153 | 161 | 165 | 218 | 153 |
| 72 | 40 | 47 | 43 | 86 | 92 | 93 | 138 | 151 | 155 | 195 | 140 |
| 73 | 36 | 43 | 39 | 79 | 85 | 85 | 122 | 142 | 145 | 188 | 129 |
| 74 | 33 | 39 | 35 | 71 | 78 | 77 | 107 | 134 | 135 | 173 | 119 |
| 75 | 30 | 35 | 32 | 64 | 71 | 69 | 93 | 126 | 125 | 158 | 109 |
| 76 | 27 | 32 | 28 | 57 | 64 | 61 | 80 | 119 | 114 | 144 | 98 |
| 77 | 24 | 29 | 25 | 50 | 58 | 53 | 68 | 112 | 103 | 129 | 85 |
| 78 | 21 | 26 | 22 | 43 | 52 | 45 | 59 | 105 | 92 | 115 | 71 |
| 79 | 18 | 23 | 19 | 37 | 46 | 38 | 51 | 98 | 82 | 102 | 58 |
| 80 | 16 | 20 | 17 | 32 | 40 | 32 | 44 | 90 | 72 | 88 | 46 |
| 81 | 14 | 18 | 14 | 27 | 34 | 26 | 38 | 81 | 62 | 75 | 36 |
| 82 | 12 | 16 | 12 | 23 | 28 | 22 | 32 | 71 | 53 | 63 | 29 |
| 83 | 10 | 14 | 10 | 19 | 23 | 18 | 25 | 61 | 45 | 53 | 24 |
| 84 | 8 | 12 | 8 | 16 | 19 | 15 | 21 | 51 | 38 | 44 | 20 |
| 85 | 7 | 10 | 7 | 13 | 16 | 12 | 15 | 41 | 31 | 36 | 17 |
| 86 | 6 | 8 | 6 | 10 | 13 | 9 | 11 | 32 | 25 | 28 | 14 |
| 87 | 5 | 7 | 5 | 8 | 11 | 6 | 8 | 24 | 19 | 21 | 11 |
| 88 | 4 | 6 | 4 | 6 | 8 | 4 | 6 | 17 | 14 | 16 | 9 |
| 89 | 3 | 5 | 3 | 5 | 6 | 2 | 4 | 11 | 10 | 12 | 7 |
| 90 | 2 | 4 | 2 | 4 | 4 | 1 | 3 | 7 | 7 | 8 | 5 |

These tables shew that the mortality and chance of life are very various in different places; and that therefore, to obtain a sufficient accuracy in this business, it is necessary to adapt a table of probabilities or chances of life, to every place for which annuities are to be calculated; or at least one set of tables for large towns, and another for country places, as well as for the supposition of different rates of interest.

Several of the foregoing tables, as they commenced with numbers different from one another, are here reduced to the same number at the beginning, viz. 1000 persons, by which means we are enabled by inspection, at any age, to compare the numbers together, and immediately perceive the relative degrees of vitality at the several places. The tables are also arranged according to the degree of vitality amongst them; the least, or that at Vienna, first; and the rest in their order, to the highest, which is the province of Vaud in Switzerland. The authorities upon which these tables depend, are as they here follow. The first, taken from Dr. Price's Observations on Reversionary payments, is formed from the bills at Vienna, for 8 years, as given by Mr. Susmilch, in his *Gottliche Ordnung*; the 2d. for Berlin, from the same, as formed from the bills there for 4 years, viz. from 1752 to 1755; the 3d. from Dr. Price, shewing the true probabilities of life in London, formed from the bills for ten years, viz. from 1759 to 1768; the 4th. for Norwich, formed by Dr. Price from the bills for 30 years, viz. from 1740 to 1769; the 5th. by the same, from the bills for Northampton; the 6th. as deduced by Dr. Halley, from the bills of mortality at Breslaw: the 7th. shews the probabilities of life in a country parish in Brandenburg, formed from the bills for 50 years, from 1710 to 1759, as given by Mr. Susmilch; the 8th. shews the probabilities of life in the parish of Holy-Cross, near Shrewsbury, formed from a register kept by the Rev. Mr. Garsuch, for 20 years, from 1750 to 1770; the 9th. for Holland, was formed by M. Kersseboom, from the registers of certain annuities for lives granted by the government of Holland, which had been kept there for 125 years, in which the ages of the several annuitants dying during that period had been truly entered; the 10th. for France, were formed by M. Parcieux, from the lists of the French tontines, or long annuities, and verified by a comparison with the mortuary registers of several religious houses for both sexes; and the 11th. or last, for the district of Vaud in Switzerland, was formed by Dr. Price from the registers of 43 parishes given by M. Muret, in the Bern Memoirs for the year 1766.

Now from such lists as the foregoing, various

tables have been formed for the valuation of annuities on single and joint lives, at several rates of interest, in which the value is shewn by inspection. The following are those that are given by Mr. Simpson, in his Select Exercises, as deduced from the London bills of mortality.

## TABLE II.

*Shewing the Value of an Annuity on One Life, or Number of Years Annuity in the Value, supposing Money to bear Interest at the several Rates of* 3, 4, *and* 5 *per Cent.*

| Age. | Years value at 3 per cent. | Years value at 4 per cent. | Years value at 5 per cent. | Age. | Years value at 3 per cent. | Years value at 4 per cent. | Years value at 5 per cent. |
|---|---|---|---|---|---|---|---|
| 6 | 18·8 | 16·2 | 14·1 | 41 | 13·0 | 11·4 | 10·2 |
| 7 | 18·9 | 16·3 | 14·2 | 42 | 12·8 | 11·2 | 10·1 |
| 8 | 19·0 | 16·4 | 14·3 | 43 | 12·6 | 11·1 | 10·0 |
| 9 | 19·0 | 16·4 | 14·3 | 44 | 12·5 | 11·0 | 9·9 |
| 10 | 19·0 | 16·4 | 14·3 | 45 | 12·3 | 10·8 | 9·8 |
| 11 | 19·0 | 16·4 | 14·3 | 46 | 12·1 | 10·7 | 9·7 |
| 12 | 18·9 | 16·3 | 14·2 | 47 | 11·9 | 10·5 | 9·5 |
| 13 | 18·7 | 16·2 | 14·1 | 48 | 11·8 | 10·4 | 9·4 |
| 14 | 18·5 | 16·0 | 14·0 | 49 | 11·6 | 10·2 | 9·3 |
| 15 | 18·3 | 15·8 | 13·9 | 50 | 11·4 | 10·1 | 9·2 |
| 16 | 18·1 | 15·6 | 13·7 | 51 | 11·2 | 9·9 | 9·0 |
| 17 | 17·9 | 15·4 | 13·5 | 52 | 11·0 | 9·8 | 8·9 |
| 18 | 17·6 | 15·2 | 13·4 | 53 | 10·7 | 9·6 | 8·8 |
| 19 | 17·4 | 15·0 | 13·2 | 54 | 10·5 | 9·4 | 8·6 |
| 20 | 17·2 | 14·8 | 13·0 | 55 | 10·3 | 9·3 | 8·5 |
| 21 | 17·0 | 14·7 | 12·9 | 56 | 10·1 | 9·1 | 8·4 |
| 22 | 16·8 | 14·5 | 12·7 | 57 | 9·9 | 8·9 | 8·2 |
| 23 | 16·5 | 14·3 | 12·6 | 58 | 9·6 | 8·7 | 8·1 |
| 24 | 16·3 | 14·1 | 12·4 | 59 | 9·4 | 8·6 | 8·0 |
| 25 | 16·1 | 14·0 | 12·3 | 60 | 9·2 | 8·4 | 7·9 |
| 26 | 15·9 | 13·8 | 12·1 | 61 | 8·9 | 8·2 | 7·7 |
| 27 | 15·6 | 13·6 | 12·0 | 62 | 8·7 | 8·1 | 7·6 |
| 28 | 15·4 | 13·4 | 11·8 | 63 | 8·5 | 7·9 | 7·4 |
| 29 | 15·2 | 13·2 | 11·7 | 64 | 8·3 | 7·7 | 7·3 |
| 30 | 15·0 | 13·1 | 11·6 | 65 | 8·0 | 7·5 | 7·1 |
| 31 | 14·8 | 12·9 | 11·4 | 66 | 7·8 | 7·3 | 6·9 |
| 32 | 14·6 | 12·7 | 11·3 | 67 | 7·6 | 7·1 | 6·7 |
| 33 | 14·4 | 12·6 | 11·2 | 68 | 7·4 | 6·9 | 6·6 |
| 34 | 14·2 | 12·4 | 11·0 | 69 | 7·1 | 6·7 | 6·4 |
| 35 | 14·1 | 12·3 | 10·9 | 70 | 6·9 | 6·5 | 6·2 |
| 36 | 13·9 | 12·1 | 10·8 | 71 | 6·7 | 6·3 | 6·0 |
| 37 | 13·7 | 11·9 | 10·6 | 72 | 6·5 | 6·1 | 5·8 |
| 38 | 13·5 | 11·8 | 10·5 | 73 | 6·2 | 5·9 | 5·6 |
| 39 | 13·3 | 11·6 | 10·4 | 74 | 5·9 | 5·6 | 5·4 |
| 40 | 13·2 | 11·5 | 10·3 | 75 | 5·6 | 5·4 | 5·2 |

## TABLE III.

*Shewing the Value of an Annuity for Two Joint Lives, that is, for as long as they may exist together.*

| Age of Younger | Age of Elder | Value at 3 per cent. | Value at 4 per cent | Value at 5 per cent. |
|---|---|---|---|---|
| 10 | 10 | 14·7 | 13·0 | 11·6 |
| | 15 | 14·3 | 12·7 | 11·3 |
| | 20 | 13·8 | 12·2 | 10·8 |
| | 25 | 13·1 | 11·6 | 10·2 |
| | 30 | 12·3 | 10·9 | 9·7 |
| | 35 | 11·5 | 10·2 | 9·1 |
| | 40 | 10·7 | 9·6 | 8·6 |
| | 45 | 10·0 | 9·0 | 8·1 |
| | 50 | 9·3 | 8·4 | 7·6 |
| | 55 | 8·6 | 7·8 | 7·1 |
| | 60 | 7·8 | 7·2 | 6·6 |
| | 65 | 6·9 | 6·5 | 6·1 |
| | 70 | 6·1 | 5·8 | 5·5 |
| | 75 | 5·3 | 5·1 | 4·9 |
| 15 | 15 | 13·9 | 12·3 | 11·0 |
| | 20 | 13·3 | 11·8 | 10·5 |
| | 25 | 12·6 | 11·2 | 10·1 |
| | 30 | 11·9 | 10·6 | 9·5 |
| | 35 | 11·2 | 10·0 | 9·0 |
| | 40 | 10·4 | 9·4 | 8·5 |
| | 45 | 9·6 | 8·8 | 8·0 |
| | 50 | 8·9 | 8·2 | 7·5 |
| | 55 | 8·2 | 7·6 | 7·0 |
| | 60 | 7·5 | 7·0 | 6·5 |
| | 65 | 6·8 | 6·4 | 6·0 |
| | 70 | 6·0 | 5·7 | 5·4 |
| | 75 | 5·2 | 5·0 | 4·8 |
| 20 | 20 | 12·8 | 11·3 | 10·1 |
| | 25 | 12·2 | 10·8 | 9·7 |
| | 30 | 11·6 | 10·3 | 9·2 |
| | 35 | 10·9 | 9·8 | 8·8 |
| | 40 | 10·2 | 9·2 | 8·4 |
| | 45 | 9·5 | 8·6 | 7·9 |
| | 50 | 8·8 | 8·0 | 7·4 |
| | 55 | 8·1 | 7·5 | 6·9 |
| | 60 | 7·4 | 6·9 | 6·4 |
| | 65 | 6·7 | 6·3 | 5·9 |
| | 70 | 6·0 | 5·7 | 5·4 |
| | 75 | 5·2 | 5·0 | 4·8 |
| 25 | 25 | 11·8 | 10·5 | 9·4 |
| | 30 | 11·3 | 10·1 | 9·0 |
| | 35 | 10 7 | 9·6 | 8·6 |
| | 40 | 10·0 | 9·1 | 8·2 |
| | 45 | 9·4 | 8·5 | 7·8 |
| | 50 | 8·7 | 7·9 | 7·3 |
| | 55 | 8·0 | 7·4 | 6·8 |
| | 60 | 7·3 | 6·8 | 6·3 |
| | 65 | 6·6 | 6·2 | 5·8 |
| | 70 | 5·9 | 5·6 | 5·3 |
| | 75 | 5·1 | 4·9 | 4·7 |
| 30 | 30 | 10·8 | 9·6 | 8·6 |
| | 35 | 10·3 | 9·2 | 8·3 |
| | 40 | 9·7 | 8·8 | 8·0 |
| | 45 | 9·1 | 8·3 | 7·6 |
| | 50 | 8·5 | 7·8 | 7·2 |
| | 55 | 7·9 | 7·3 | 6·7 |
| | 60 | 7·2 | 6·7 | 6·2 |
| | 65 | 6·5 | 6·1 | 5·7 |
| | 70 | 5·8 | 5·5 | 5·2 |
| | 75 | 5·1 | 4·9 | 4·7 |

| Age of Younger | Age of Elder | Value at 3 per cent. | Value at 4 per cent. | Value at 5 per cent. |
|---|---|---|---|---|
| 35 | 35 | 9·9 | 8·8 | 8·0 |
| | 40 | 9·4 | 8·5 | 7·7 |
| | 45 | 8·9 | 8·1 | 7·4 |
| | 50 | 8·3 | 7·6 | 7·0 |
| | 55 | 7·7 | 7·1 | 6·6 |
| | 60 | 7·1 | 6·5 | 6·1 |
| | 65 | 6·4 | 6·0 | 5·6 |
| | 70 | 5·7 | 5·4 | 5·1 |
| | 75 | 5·0 | 4·8 | 4·6 |
| 40 | 40 | 9·1 | 8·1 | 7·3 |
| | 45 | 8·7 | 7·8 | 7·1 |
| | 50 | 8·2 | 7·4 | 6·8 |
| | 55 | 7·6 | 6·9 | 6·4 |
| | 60 | 7·0 | 6·4 | 6·0 |
| | 65 | 6·4 | 5·9 | 5·5 |
| | 70 | 5·7 | 5·4 | 5·1 |
| | 75 | 5·0 | 4·8 | 4·6 |
| 45 | 45 | 8·3 | 7·4 | 6·7 |
| | 50 | 7·9 | 7·1 | 6·5 |
| | 55 | 7·4 | 6·7 | 6·2 |
| | 60 | 6·8 | 6·3 | 5·8 |
| | 65 | 6·3 | 5·8 | 5·4 |
| | 70 | 5·6 | 5·3 | 5·0 |
| | 75 | 4·9 | 4·7 | 4·5 |
| 50 | 50 | 7·6 | 6·8 | 6·2 |
| | 55 | 7·2 | 6·5 | 6·0 |
| | 60 | 6·7 | 6·1 | 5·7 |
| | 65 | 6·2 | 5·7 | 5·3 |
| | 70 | 5·5 | 5·2 | 4·9 |
| | 75 | 4·8 | 4·6 | 4·4 |
| 55 | 55 | 6·9 | 6·2 | 5·7 |
| | 60 | 6·5 | 5·9 | 5·5 |
| | 65 | 6·0 | 5·6 | 5·2 |
| | 70 | 5·4 | 5·1 | 4·8 |
| | 75 | 4·7 | 4·5 | 4·3 |
| 60 | 60 | 6·1 | 5·6 | 5·2 |
| | 65 | 5·7 | 5·3 | 4·9 |
| | 70 | 5·2 | 4·9 | 4·6 |
| | 75 | 4·6 | 4·4 | 4·2 |
| 65 | 65 | 5·4 | 5·0 | 4·7 |
| | 70 | 4·9 | 4·6 | 4·4 |
| | 75 | 4·4 | 4·2 | 4·0 |
| 70 | 70 | 4·6 | 4·4 | 4·2 |
| | 75 | 4·2 | 4·0 | 3·9 |
| 75 | 75 | 3·8 | 3·7 | 3·6 |

## TABLE IV.

*For the Value of an Annuity upon the Longer of Two given Lives.*

| Age of Younger | Age of Elder. | Value at 3 per Cent. | Value at 4 per Cent. | Value at 5 per Cent. |
|---|---|---|---|---|
| 10 | 10 | 23·4 | 19·9 | 17·1 |
| | 15 | 22·9 | 19·5 | 16·8 |
| | 20 | 22·5 | 19·1 | 16·6 |
| | 25 | 22·2 | 18·8 | 16·4 |
| | 30 | 21·9 | 18·6 | 16·2 |
| | 35 | 21·6 | 18·4 | 16·1 |
| | 40 | 21·4 | 18·3 | 16·0 |
| | 45 | 21·2 | 18·2 | 15·9 |
| | 50 | 20·9 | 18·0 | 15·8 |
| | 55 | 20·7 | 17·8 | 15·7 |
| | 60 | 20·4 | 17·6 | 15·5 |
| | 65 | 20·1 | 17·4 | 15·3 |
| | 70 | 19·8 | 17·2 | 15·1 |
| | 75 | 19·5 | 16·9 | 14·8 |
| 15 | 15 | 22·8 | 19·3 | 16·7 |
| | 20 | 22·3 | 18·9 | 16·4 |
| | 25 | 21·9 | 18·6 | 16·2 |
| | 30 | 21·6 | 18·3 | 16·0 |
| | 35 | 21·3 | 18·1 | 15·9 |
| | 40 | 21·1 | 17·9 | 15·7 |
| | 45 | 20·9 | 17·8 | 15·6 |
| | 50 | 20·7 | 17·6 | 15·4 |
| | 55 | 20·4 | 17·4 | 15·3 |
| | 60 | 20·1 | 17·2 | 15·2 |
| | 65 | 19·8 | 16·9 | 15·0 |
| | 70 | 19·4 | 16·6 | 14·7 |
| | 75 | 18·9 | 16·3 | 14·4 |
| 20 | 20 | 21·6 | 18·3 | 15·8 |
| | 25 | 21·1 | 17·9 | 15·5 |
| | 30 | 20·7 | 17·6 | 15·3 |
| | 35 | 20·4 | 17·4 | 15·1 |
| | 40 | 20·1 | 17·2 | 15·0 |
| | 45 | 19·9 | 17·0 | 14·9 |
| | 50 | 19·6 | 16·8 | 14·7 |
| | 55 | 19·4 | 16·6 | 14·5 |
| | 60 | 19·1 | 16·3 | 14·3 |
| | 65 | 18·7 | 16·0 | 14·1 |
| | 70 | 18·2 | 15·7 | 13·8 |
| | 75 | 17.7 | 15·3 | 13·5 |
| 25 | 25 | 20·3 | 17·4 | 15·1 |
| | 30 | 19·8 | 17·0 | 14·9 |
| | 35 | 19·4 | 16·7 | 14·7 |
| | 40 | 19.2 | 16·5 | 14·5 |
| | 45 | 18·9 | 16·3 | 14·3 |
| | 50 | 18·7 | 16·1 | 14·2 |
| | 55 | 18·4 | 15·9 | 14·0 |
| | 60 | 18·0 | 15·6 | 13·8 |
| | 65 | 17·6 | 15·3 | 13·6 |
| | 70 | 17·2 | 15·0 | 13·3 |
| | 75 | 16·7 | 14·6 | 12·9 |
| 30 | 30 | 19·3 | 16·6 | 14·5 |
| | 35 | 18·8 | 16·2 | 14·2 |
| | 40 | 18·4 | 15·9 | 14·0 |
| | 45 | 18·1 | 15·6 | 13·8 |
| | 50 | 17·8 | 15·4 | 13·6 |
| | 55 | 17·4 | 15·1 | 13·4 |
| | 60 | 17·0 | 14·8 | 13·2 |
| | 65 | 16·6 | 14·5 | 12·9 |
| | 70 | 16·1 | 14·1 | 12·6 |
| | 75 | 15·6 | 13·7 | 12·2 |
| 35 | 35 | 18·3 | 15·8 | 13·8 |
| | 40 | 17·8 | 15·4 | 13·5 |
| | 45 | 17·4 | 15·1 | 13·3 |
| | 50 | 17·1 | 14·8 | 13·1 |
| | 55 | 16·7 | 14·5 | 12·9 |
| | 60 | 16·3 | 14·2 | 12·7 |
| | 65 | 15·8 | 13·8 | 12·4 |
| | 70 | 15·3 | 13·4 | 12·0 |
| | 75 | 14·8 | 13·0 | 11·6 |
| 40 | 40 | 17·3 | 15·0 | 13·3 |
| | 45 | 16·8 | 14·6 | 13·0 |
| | 50 | 16·3 | 14·2 | 12·7 |
| | 55 | 15·9 | 13·9 | 12·4 |
| | 60 | 15·4 | 13·5 | 12·1 |
| | 65 | 14·9 | 13·1 | 11·8 |
| | 70 | 14·5 | 12·7 | 11·4 |
| | 75 | 14·0 | 12·3 | 11·0 |
| 45 | 45 | 16·2 | 14·2 | 12·8 |
| | 50 | 15·7 | 13·8 | 12·5 |
| | 55 | 15·2 | 13·4 | 12·1 |
| | 60 | 14·7 | 12·9 | 11·7 |
| | 65 | 14·1 | 12·5 | 11·4 |
| | 70 | 13·6 | 12·0 | 11·0 |
| | 75 | 13·1 | 11·6 | 10·6 |
| 50 | 50 | 15·0 | 13·3 | 12·1 |
| | 55 | 14·5 | 12·9 | 11·7 |
| | 60 | 13·9 | 12·4 | 11·3 |
| | 65 | 13·3 | 12·0 | 10·9 |
| | 70 | 12·8 | 11·5 | 10·5 |
| | 75 | 12·3 | 11·0 | 10·1 |
| 55 | 55 | 13·6 | 12·4 | 11·3 |
| | 60 | 13·0 | 11·9 | 10·9 |
| | 65 | 12·4 | 11·3 | 10·5 |
| | 70 | 11·8 | 10·8 | 10·0 |
| | 75 | 11·3 | 10·3 | 9·5 |
| 60 | 60 | 12·2 | 11·2 | 10·5 |
| | 65 | 11·5 | 10·6 | 10·0 |
| | 70 | 10·9 | 10·1 | 9·5 |
| | 75 | 10·3 | 9·5 | 9·0 |
| 65 | 65 | 10·7 | 10·0 | 9·4 |
| | 70 | 10·0 | 9·4 | 8·9 |
| | 75 | 9·3 | 8·7 | 8·3 |
| 70 | 70 | 9·2 | 8·6 | 8·2 |
| | 75 | 8·4 | 7·9 | 7·6 |
| 75 | 75 | 7·6 | 7·2 | 6·9 |

The uses of these tables may be exemplified in the following problems:

PROB. 1. *To find the probability or proportion of chance, that a person of a given age continues in being a proposed number of years.*—Thus, suppose the age be 40, and the number of years proposed 15; then, to calculate by the table of the probabilities for London, in tab. 1. against 40 years stands 214; and against 55 years, the age to which the person must arrive, stands 120; which shews that, of 214 persons who attain to the age of 40, only 120 of them reach the age of 55, and consequently 94 die between the ages of 40 and 55. It is evident therefore that the odds for attaining the proposed age of 55, are as 120 to 94, or as 9 to 7 nearly.

PROB. 2. *To find the value of an annuity for a proposed life.*—This problem is resolved from tab. 2, by looking against the given age, and under the proposed rate of interest; then the corresponding quantity shews the number of years purchase required. For example, if the given age be 36, the rate of interest 4 per cent. and the proposed annuity 250l. Then in the table it appears that the value is 12·1 years purchase, or 12·1 times 250l., that is 3025l.

After the same manner the answer will be found in any other case falling within the limits of the table. But as there may sometimes be occasion to know the values of lives computed at higher rates of interest that those in the table, the two following practical rules are subjoined; by which the problem is resolved independent of tables.

*Rule* 1. When the given age is not less than 45 years, nor greater than 85, subtract it from 92; then multiply the remainder by the perpetuity, and divide the product by the said remainder added to $2\frac{1}{2}$ times the perpetuity; so shall the quotient be the number of years purchase required. Where note, that by the perpetuity is meant the number of years purchase of the fee-simple; found by dividing 100 by the rate per cent. at which interest is reckoned.

*Ex.* Let the given age be 50 years, and the rate of interest 10 per cent. Then subtracting 50 from 92, there remains 42; which multiplied by 10 the perpetuity, gives 420; and this divided by 67, the remainder increased by $2\frac{1}{2}$ times 10 the perpetuity, quotes 6·3 nearly, for the number of years purchase. Therefore, supposing the annuity to be 100l., its value in present money will be 630l.

*Rule* 2. When the age is between 10 and 45 years, take 8-tenths of what it wants of 45, which divide by the rate per cent. increased by 1·2; then if the quotient be added to the value of a life of 45 years, found by the preceding rule, there will be obtained the number of years purchase in this case. For example, let the proposed age be 20 years, and the rate of interest 5 per cent. Here taking 20 from 45, there remains 25; 8-tenths of which is 20; which divided by 6·2, quotes 3·2; and this added to 9·8, the value of a life of 45, found by the former rule, gives 13 for the number of years purchase that a life of 20 ought to be valued at.

And the conclusions derived by these rules, Mr. Simpson adds, are so near the true values, computed from real observations, as seldom to differ from them by more than 1-tenth or 2-tenths of one year's purchase.

The observations here alluded to, are those which are founded on the London bills of mortality. And a similar method of solution, accommodated to the Breslaw observations, will be as follows, viz. "Multiply the difference between the given age and 85 years by the perpetuity, and divide the product by 8-tenths of the said difference increased by double the perpetuity, for the answer." Which, from 8 to 80 years of age, will commonly come within less than $\frac{1}{8}$ of a year's purchase of the truth.

PROB. 3. *To find the value of an annuity for two joint lives, that is, for as long as they both continue in being together.*—In table 3, find the younger age, or that nearest to it, in column 1, and the higher age in column 2; then against this last is the number of years purchase in the proper column for the interest.

*Ex.* Suppose the two ages be 20 and 35 years; then the value

is 10·9 years purchase at 3 per cent.
or 9·8 —— ——— at 4 per cent.
or 8·8 —— ——— at 5 per cent.

PROB. 4. *To find the value of an annuity for the* longest *of two lives, that is, for as long as either of them continue in being.*—In table 4, find the age of the youngest life, or the nearest to it, in col. 1, and the age of the elder in col. 2: then against this last is the answer in the proper column of interest.

*Ex.* So, if the two ages be 15 and 40, then the value of the annuity upon the longest of two such lives,

is 21·1 years purchase at 3 per cent.
or 17·9 —— ——— at 4 per cent.
or 15·7 —— ——— at 5 per cent.

N. B. In the last two problems, if the younger age, or the rate of interest, be not exactly found in the tables, the nearest to them may be taken, and then by proportion the value for the true numbers will be nearly found.

Rules and tables for the values of three lives, &c. may also be seen in Simpson, and in Baron Maseres's Annuities, &c. All these calculations have been made from tables of the real mortuary registers, differing unequally at the several ages. But rules have also been given upon other principles, as by De Moivre, upon the supposition that the decrements of life are equal at all ages; an assumption not much differing from the truth, from 7 to 70 years of age: and for the real probabilities of life as deduced from observations, by Mr. Morgan and by Mr. Baily, see the last mentioned author's book on this subject, quoted and commended above.

LIFE-*Boat.* See BOAT.

LIFE, *Tree of,* in botany. See THUYA.

LIFE, *Wood of,* in botany. See QUAIACUM.

LIFE *Everlasting.* See GNAPHALIUM.

LI'FEBLOOD. *s.* (*life* and *blood.*) The blood necessary to life; the vital blood (*Spectator*).

LI'FEGIVING. *a.* (*life* and *giving.*) Having the power to give life (*Spenser*).

LIFEGUA'RD. *s.* (*life* and *guard.*) The guard of a king's person.

LI'FELESS. *a.* (from *life.*) 1. Dead; deprived of life (*Prior*). 2. Unanimated; void of life (*Milton*). 3. Wanting power, force, or spirit (*Prior*).

LI'FELESSLY. *ad.* (from *lifeless.*) Without vigour; frigidly; jejunely.

LI'FELIKE. *a.* (*life* and *like.*) Like a living person (*Pope*).

LI'FESTRING. *s.* (*life* and *string.*) Nerve; string imagined to convey life (*Daniel*).

LI'FETIME. *s.* (*life* and *time.*) Continuance or duration of life (*Addison*).

LI'FEWEARY. *a.* (*life* and *weary.*) Wretched; tired of living (*Shakspeare*).

*To* LIFT. *v. a.* (*lyfta*, Swedish.) 1. To raise from the ground; to heave; to elevate; to hold on high (*Dryden*). 2. To bear; to support: not in use (*Spenser*). 3. To rob; to plunder (*Dryden*). 4. To exalt; to elevate mentally (*Pope*). 5. To raise in fortune (*Ecclus*). 6. To raise in estimation (*Hook.*) 7. To exalt in dignity (*Addison*). 8. To elevate; to swell, as with pride (*Atterbury*).

*To* LIFT. *v. n.* To strive to raise by strength (*Locke*).

LIFT. *s.* (from the verb.) 1. The manner of lifting (*Bacon*). 2. The act of lifting (*L'Estrange*). 3. Effort; struggle (*Hudibr.*) 4. A load or surcharge of any thing. 5. (In Scottish.) The sky. 6. *Lifts* of a sail, are ropes to raise or lower them at pleasure.

LI'FTER. *s.* (from *lift.*) One that lifts (*Psalms*).

*To* LIG. *v. n.* (*leggen*, Dutch.) To lie (*Spenser*).

LI'GAMENTS, (*Ligament, i*, n. from *ligo*, to bind). In anatomy are elastic and strong membranes connecting the extremities of the moveable bodes. They are divided into capsular, which surround joints like a bag, and connecting ligaments. The use of the capsular ligaments is to connect the extremities of the moveable bones, and prevent the efflux of synovia; the external and internal connecting ligaments strengthen the extremities of the moveable bones.

*Table of the Ligaments.*

*Ligaments of the lower jaw.*—The condyles of the lower jaw are connected with the articular sinuses of the temporal bone by two ligaments, the capsula and lateral ligament.

*Ligaments of the occipital bone, and vertebræ of the neck.* The condyles of the occipital bone are united with the articular depressions of the first vertebræ by the capsular, broad, anterior, and posterior ligaments, the ligaments of the odontoid process, and ligamentum nuchæ.

*Ligaments of the vertebræ.* The vertebræ are connected together by means of their bodies and oblique processes. The bodies by a soft cartilaginous substance, and the processes by ligaments, viz. the transverse ligament of the first vertebræ; the anterior and posterior common; the interspinous; the intertransverse; the intervertebral ligaments: the capsular ligaments of the oblique processes; and the ligaments of the last vertebræ of the loins with the os sacrum.

*Ligaments of the ribs.* The posterior extremity of the ribs is united with the vertebræ; the anterior with the sternum. The ligaments of the posterior extremity are, the capsular ligaments of the greater and lesser heads; the internal and external ligaments of the neck of the ribs; and a ligament peculiar to the last rib. The ligaments of the anterior extremity are, the capsular ligaments of the cartilages of the true ribs, and the ligaments of the ribs *inter se.*

*Ligaments of the sternum.* The ligaments connecting the three portions of the sternum to the ribs are, the membrana propria of the sternum; and the ligaments of the ensiform cartilage.

*Ligaments of the pelvis.* The ligaments which connect the ossa innominata with the os sacrum are, three ligamenta ileo sacra; two sacroischiatic ligaments; two transverse ligaments of the pelvis: the ligamentum obturans of the foramen ovale, and the ligamentum Popartii, or inguinale. See PELVIS.

*Ligaments of the os coccygis.* The basis of the os coccygis is connected to the apex of the os sacrum, by the capsular and longitudinal ligaments.

*Ligaments of the clavicle.* The anterior extremity is connected with the sternum and first rib; and the posterior extremity with the acromion of the scapula, by the inter clavicular, the capsular ligament, the ligamentum rhomboideum, and in the posterior extremity, the capsular ligament.

*Ligaments of the scapula.* The proper ligaments which connect the scapula with the posterior extremity of the clavicle are, the conoid and trapezoid ligaments.

*Ligaments of the humerus.* The head of the humerus is connected with the glenoid cavity of the scapula by the capsular ligament.

*Ligaments of the articulation of the cubit.* The elbow joint is formed by the inferior extremity of the humerus, and superior extremities of the ulna and radius. The ligaments connecting these bones are, the capsular, the brachio-cubital, and the brachio-radial ligaments.

*Ligaments of the radius.* The radius is affixed to the humerus, cubit, and carpus, by peculiar ligaments, namely, the superior, inferior, oblique, and interosseous ligaments.

*Ligaments of the carpus.* The ligaments which connect the eight bones of the wrist together, and with the fore-arm and metacarpus, are, the capsular ligament of the carpus; the first and second transverse ligament; the oblique ligaments, and the capsular ligament proper to the bones of the carpus.

*Ligaments of the metacarpus.* The bones of the metacarpus are in part connected with the second row of bones of the carpus, and in part together, by the articular and interosseous ligaments.

*Ligaments of the fingers.* The fingers and phalanges are connected ogether, and with

the metacarpus; and the thumb with the carpus, by the lateral ligaments of the fingers, and ligament of the thumb with the os trapezium of the carpus.

*Ligaments which keep the tendons of the muscles of the hand in their proper place.* The ligaments which keep tendons of the muscles of the hand in their place, are situated partly on the palm and partly on the back of the hand. In the back of the hand are, the external transverse ligament of the carpus, the vaginal, and the transverse ligaments of the extensor tendons. In the palm of the hand are, the internal transverse ligament of the carpus, the vaginal or crucial ligaments of the flexor tendons of the phalanges, and the accessory ligaments of the flexor tendons.

*Ligaments of the articulation of the semur.* The head of the os femoris is strongly annexed to the acetabulum of the os innominatum, by two very strong ligaments, the capsular ligament, and the ligamentum teres, or restraining ligament.

*Ligaments of the articulation of the knee.* The knee joint is formed by the condyles of the os femoris, head of the tibia and the patella. The ligaments are the capsular, the posterior, the external and the internal lateral ligaments, the crucial and the alar ligaments, the ligaments of the semilunar cartilages, and ligaments of the patella.

*Ligaments of the fibula.* The fibula is connected with the tibia by means of the capsular ligament of the superior extremity, the interosseous ligament, and the ligaments of the inferior extremity.

*Ligaments of the articulation of the tarsus.* The inferior extremity of the tibia and fibula forms the cavity into which the astragalus of the tarsus is received. This articulation is effected by the anterior, middle, and posterior ligament of the fibula, the ligamentum tibiæ deltoides, the capsular ligament, and the ligaments proper to the bones of the tarsus.

*Ligaments of the metatarsus.* The bones of the metatarsus are connected in part together, and in part with the tarsus, by means of the capsular ligament, the articular ligaments, the transverse ligaments in the back and sole of the foot, and the interosseous ligaments of the metatarsus.

*Ligaments of the toes.* The phalanges of the toes are united partly together, and partly with the metatarsus, by the capsular and lateral ligaments.

*Ligaments which retain the tendons of the muscles of the foot in their proper place.* These ligaments are found partly in the back and partly in the sole of the foot. They are the vaginal ligament of the tibia, the transverse or crucial ligaments of the tarsus, the ligaments of the tendons of the peronei muscles, the laciniated ligament, the vaginal ligament of the extensor muscle and flexor pollicis, the vaginal ligaments of the flexor tendons, the accessory ligaments of the flexor tendons, and the transverse ligaments of the extensor tendons.

LIGAME'NTUM Ciliare. Behind the uvea of the human eye, there arise out of the choroid membrane, from the cilliary circle, white complicated striæ, covered with a black matter, and running from thence backwards, firmly attached to the very thin membrane of the vitreous humour, where it is inserted into the chrystalline lens. The fluctuating extremities of these striæ are spread abroad even to the crystalline lens, upon which they lie, but are not affixed. Taken together they are called *ligamentum ciliare.*

Ligame'ntum *ovarii.* The thick round portion of the broad ligament of the uterus, by which the ovarium is connected with the uterus. The ancients supposed this was hollow, to convey the female semen into the uterus.

Lyga'ments, *Chemical analysis of.* The membranous, ligamentous and tendinous parts of the animal body upon minute analysis appear to consist of the same or of similar materials. They are all insoluble in cold water, but by a gentle heat and after a certain time they produce an acidity perceptible both by the smell and taste. They readily pass to the putrid fermentation; but what chiefly characterises them is, that when these white membranous, tendinous and ligamentous parts are put into boiling water, or are submitted to a boiling heat, they gradually become soft, lose their texture, and are converted into a viscous, clammy, more or less thick liquid, which, on becoming cool, takes the form of a clear jelly, and is of great use in the arts under the name of glue. See Gelatin.

When exposed to a gentle heat without the intervention of water, they become dry, lose their toughnes, are transparent, brittle, and easily break with a snapping between the fingers. By a stronger heat they curl up and are contracted; and on continuing the heat, they melt, produce a fetid disagreeable smell, although not so empyreumatic as the more animalized parts: they swell and inflame although the inflammation is somewhat difficult. The coal which remains is light, and easily incinerated, whilst from their affording the usual products of animal substances in a small degree, they may be looked upon as but slightly animalized.

Ligaments chiefly differ from tendons and membranes, in resisting with a greater obstinacy the action of boiling water, and in retaining their form and even their strength for some time after boiling. How far they resemble coagulated albumen remains to be ascertained. Perhaps they will be found to form a separate genus.

LIGAME'NTAL. } *a.* (from *ligament.*)
LIGAME'NTOUS. } Composing a ligament (*Brown. Wiseman*).

Q. LIGARIUS, a Roman pro-consul of Africa, after Considius. In the civil wars

he followed the interest of Pompey, and was pardoned by Cæsar. Cæsar, however, and his adherents, were determined on the ruin of Ligarius, but Cicero, by an eloquent oration, still extant, defeated his accusers, and he was pardoned. He became afterwards one of Cæsar's murderers.

LIGATION. *s.* (*ligatio*, Latin.) 1. The act of binding. 2. The state of being bound (*Addison*).

LI'GATURE. *s.* (*ligature*, French.) 1. Any thing tied round another; bandage (*Spectator*). 2. The act of binding (*Arbuth.*) 3. The state of being bound (*Mortimer*).

LIGATURE, in surgery, any thing tied about a part of the body, more especially a bandage, or fillet of cloth or linen, serving to bind the arm, and facilitate the operation of bleeding.

They are called also chords, bands, or strings, and are of different kinds, some fine, others coarse and strong, and are made either of flax, or hemp, or cloth, or silk, or horsehair, according to the nature of the disorder; for these things are almost constantly required. They are used to replace or extend bones that are broken or dislocated; to tie the patients down in lythotomy, amputations, and operations of that kind; to tie up the veins in phlebotomy; to tie up arteries after amputations, or in large wounds; to secure the splints that are applied to fractures; to tie up the processes of the peritoneum, with the spermatic vessels, in castration; and lastly, in taking off warts, and other excrescencies by ligature, and in all other operations of this kind.

Ligature is also used for a state of impotency, in respect to venery, pretended to be caused by some charm, or witchcraft.

Kæmpfer tells of an uncommon kind of ligature, or knotting, in use among the people of Massacar, Java, Malaja, Siam, &c. By this charm, or spell, a man binds up a woman, and a woman a man, so as to put it out of their power to have to do with any other person; the man being thereby rendered impotent to any other woman, and all other men impotent with respect to the woman.

Ligature, in mathematics, is a term used by Dr. Wallis, to signify compendious notes or characters by which the sums, differences, rectangles, sums of squares, &c. of quantities are designated; so that results of operations may be very concisely expressed. Dr. Wallis gives at pages 67, 111, &c. of his Algebra, several instances of the use of these ligatures, from Oughtred's Clavis.

Liga'ture, in music, is a band, or link, by which notes are connected and tied together. At present we only tie the tails of quavers and notes of shorter duration; but the old masters tied or linked together the heads of their square notes.

LIGER or Ligeris, a large river of Gaul, falling into the ocean, now called la Loire.

LIGHT. *s.* (leoht, Saxon.) 1. That material medium of sight; that body by which we see (*Newton*). 2. State of the elements, in which things become visible: opposed to darkness (*Gen.*) 3. Power of perceiving external objects by the eye: opposed to blindness (*Milton*). 4. Day (*Milton*). 5. Life (*Pope*). 6. Artificial illumination (*Numbers*). 7. Illumination of mind; instruction; knowledge (*Bacon*). 8. The part of a picture which is drawn with bright colours, or on which the light is supposed to fall (*Dryden*). 9. Reach of knowledge; mental view (*Bac.*) 10. Point of view; situation; direction in which the light falls (*Addison*). 11. Public notice; public view (*Pope*). 12. The public (*Pope*). 13. Explanation (*Locke*). 14. Any thing that gives light; a pharos; a taper; any luminous body (*Glanville*).

Light. *a.* (leoht, Saxon.) 1. Not tending to the centre with great force; not heavy (*Addison*). 2. Not burdensome; easy to be worn, or carried, or lifted; not onerous (*Bacon*). 3. Not afflictive; easy to be endured (*Hooker*). 4. Easy to be performed; not difficult (*Dryden*). 5. Easy to be acted on by any power (*Dryden*). 6. Not heavily armed (*Knolles*). 7. Active; nimble (*Spens.*) 8. Unencumbered; unembarrassed; clear of impediments (*Bacon*). 9. Slight; not great (*Boyle*). 10. Not dense; not gross (*Numb.*) 11. Easy to admit any influence; unsteady; unsettled; loose (*Shakspeare*). 12. Gay; airy; wanting dignity or solidity; trifling (*Shakspeare*). 13. Not chaste; not regular in conduct (*Shakspeare*). 14. (from *light*, *s.*) Bright; clear (*Genesis*). 15. Not dark; tending to whiteness (*Dryden*).

Light. *ad.* Lightly; cheaply (*Hooker*).

*To* Light. *v. a.* (from the noun.) 1. To kindle; to inflame; to set on fire (*Boyle*). 2. To give light to; to guide by light (*Crash.*) 3. To illuminate; to fill with light (*Dryden*). 4. (from the adjective.) To lighten; to ease of a burden (*Spenser*).

*To* Light. *v. n.* pret. *lighted* or *light*, or *lit.* (*lickt*, by chance, Dutch.) 1. To happen to find; to fall upon by chance (*Sidney*). 2. To fall in any particular direction (*Dryden*). 3. To fall; to strike on (*Spenser*). 4. lihtan, Saxon.) To descend from a horse or carriage (*Kings*). 5. To settle; to rest (*Shaksp.*)

Light, among philosophers, signifies sometimes that principle or substance (which ever it be) by which objects are made perceptible to our sense of seeing,—sometimes the sensation occasioned in the mind by the view of luminous objects. In the former of these senses principally we shall consider it here.

There is no branch of philosophy more deserving of our study, whether we consider its beauty, or the multitude of phenomena it exhibits. The advantages we derive from the fluid that enlightens us are sufficient of themselves to excite the closest attention, that we may fully understand its properties. If air, serving as the vehicle of speech, enables us to carry on an intercourse of thoughts with our fellow-creatures, how greatly is that intercourse improved by light,

which renders their image present to us—their image, which has so many things to say! The eye, more susceptible than the other senses of multifarious impressions, by the aid of light takes in at once in bodies the forms by which they are limited, the colours that embellish them, their relative positions, and the motions by which they are transported in space. It discriminates without confusion all those modifications that seem to sport in a thousand different ways in that grand diversity of objects to which a single look can extend itself.

But if vision were direct only, even that part of the human structure in which the eye has its seat, that which characterises us and makes us known to others, would remain unknown to ourselves. Light remedies this disadvantage, by faithfully exhibiting our portraiture behind reflecting surfaces, which have the quality of multiplying whatever is presented before them.

Nor are these all the benefits we derive from its properties. Beyond the globes that shine over our heads, there are other luminaries which the eye cannot reach on account of their immense distance, while near us exist a thousand organised beings that equally escape observation from their extreme diminutiveness. Light, by bending itself in transparent bodies terminated by curvilinear surfaces, has enabled us to perceive these two kinds of infinity, has opened to astronomy a new heaven, and a new field to natural history.

There is this advantage in the theory of light, that the course of this fluid is geometrical; so that by a few simple laws, and a precise and rigorous system, results may be obtained without much difficulty. It is well known that the celebrated Saunderson, though blind almost from his birth, delivered public lectures on optics: he considered the rays of light as simple material lines, that acted on the eye by contact; and seeing these lines in his imagination, he succeeded in making others comprehend how their eyes perceived the very objects of which the lines excited in them the impression.

The nature of light has been a subject of speculation from the first dawnings of philosophy. Some of the earliest philosophers doubted whether objects became visible by means of any thing proceeding from them, or from the eye of the spectator. But this opinion was qualified by Empedocles and Plato, who maintained, that vision was occasioned by particles continually flying off from the surfaces of bodies, which meet with others proceeding from the eye; while the effect was ascribed by Pythagoras solely to the particles proceeding from the external objects, and entering the pupil of the eye. But Aristotle defines light to be the act of a transparent body, considered as such: and he observes that light is not fire, nor yet any matter radiating from the luminous body, and transmitted through the transparent one.

The Cartesians have refined considerably on this notion; and hold that light, as it exists in the luminous body, is only a power or faculty of exciting in us a very clear and vivid sensation; or that it is an invisible fluid present at all times and in all places, but requiring to be set in motion, by a body ignited or otherwise properly qualified to make objects visible to us.

Father Malbranche explains the nature of light from a supposed analogy between it and sound.—Thus he supposes all the parts of a luminous body are in a rapid motion, which, by very quick pulses, is constantly compressing the subtle matter between the luminous body and the eye, and excites vibrations of pression. As these vibrations are greater, the body appears more luminous; and as they are quicker or slower, the body is of this or that colour.

But the Newtonians maintain, that light is not a fluid *per se*, but consists of a great number of very small particles, thrown off from the luminous body by a repulsive power with an immense velocity, and in all directions. These particles, it is also held, are emitted in right lines: which rectilinear motion they preserve till they are turned out of their path by some of the following causes, viz. by the attraction of some other body near which they pass, which is called inflection; or by passing obliquely through a medium of different density, which is called refraction; or by being turned aside by the opposition of some intervening body, which is called reflection; or lastly, by being totally stopped by some substance into which they penetrate, and which is called their extinction. A succession of these particles following one another, in an exact straight line, is called a ray of light; and this ray, in whatever manner its direction may be changed, whether by refraction, reflection, or inflection, always preserves a rectilinear course till it be again changed; neither is it possible to make it move in the arch of a circle, ellipsis, or other curve. For the above properties of the rays of light, see the several words, Refraction, Reflection, &c.

The velocity of the particles and rays of light is truly astonishing, amounting to near two-hundred thousand miles in a second of time, which is near a million times greater than the velocity of a cannon-ball. This amazing motion of light has been manifested in various ways, and first, from the eclipses of Jupiter's satellites. It was first observed by Roemer, that the eclipses of those satellites happen sometimes sooner, and sometimes later, than the times given by the tables of them; and that the observation was before or after the computed times, according as the earth was nearer to, or farther from Jupiter, than the mean distance. Hence Roemer and Cassini both concluded that this circumstance depended on the distance of Jupiter from the earth; and that, to account for it, they must suppose that the light was about 14 minutes crossing the earth's orbit. This conclusion however was afterward abandoned and attacked by Cassini himself. But Roemer's opinion found an able advocate in Dr. Halley; who removed Cassini's difficulty, and left Roemer's conclusion in its full force. Yet, in a memoir presented to the academy in 1707, M. Maraldi endeavoured to strenghthen Cassini's arguments; when Roemer's doctrine found a new defender in Mr. Pound. See Philos. Trans. number 136. It has since been found, by repeated experiments, that when the earth is exactly between Jupiter and the sun, his satellites are seen eclipsed about eight minutes and a quarter sooner than they could be according to the tables; but when the earth is nearly in the opposite point of its orbit, these eclipses happen about eight minutes and a quarter later than the tables predict them. Hence then it is certain that the motion of light is not instantaneous, but that it takes up about 16 minutes and a half of time to pass over a space equal to the diameter of the earth's orbit, which is at least 190 millions of miles in length, or at the rate of near 200,000 miles per second, as above men-

tioned. Hence therefore light takes up about eight minutes and a quarter in passing from the sun to the earth; so that, if he should be annihilated, we would see him for eight minutes and a quarter after that event should happen; and if he were again created, we should not see him till eight minutes and a quarter afterwards. Hence also it is easy to know the time in which light travels to the earth, from the moon, or any of the other planets, or even from the fixed stars when their distances shall be known; these distances however are so immensely great, that from the nearest of them, supposed to be Sirius, the dog-star, light takes up many years to travel to the earth: and it is even suspected that there are many stars whose light have not yet arrived at us since their creation. And this by-the-bye, may perhaps sometimes account for the appearance of new stars in the heavens.

It may be just observed that Galileo first conceived the notion of measuring the velocity of light; and a description of his contrivance for this purpose, is in his Treatise on Mechanics, pa. 39. He had two men with lights covered; the one who was to observe when the other uncovered his light, and to exhibit his own the moment he perceived it. This rude experiment was tried at the distance of a mile, but without success, as may naturally be imagined: the members of the Academy Del Cimento repeated the experiment, and placed their observers, to as little purpose, at the distance of two miles.

But our excellent astronomer Dr. Bradley, afterwards found nearly the same velocity of light as Roemer, from his accurate observations, and most ingenious theory, to account for some apparent motions in the fixed stars; for an account of which, see ABERRATION *of Light*. By a long series of these observations, he found the difference between the true and apparent place of several fixed stars, for different times of the year; which difference could no otherwise be accounted for, than from the progressive motion of the rays of light. From the mean quantity of this difference he ingeniously found, that the ratio of the velocity of light to the velocity of the earth in its orbit, was as 10313 to 1, or that light moves 10313 times faster than the earth moves in its orbit about the sun; and as this latter motion is at the rate of $18\frac{1}{1}\frac{1}{2}$ miles per second nearly, it follows that the former, or the velocity of light, is at the rate of about 195000 miles in a second: a motion according to which it will require just $8' 7''$ to move from the sun to the earth, or about 95 millions of miles.

It was also inferred, from the foregoing principles, that light proceeds with the same velocity from all the stars. Whence it follows, if we suppose that all the stars are not equally distant from us, as many arguments prove, that the motion of light, all the way it passes through the immense space above our atmosphere, is equable or uniform. Since the different methods of determining the velocity of light thus agree in the result, it is reasonable to conclude that, in the same medium, light is propagated with the same velocity after it has been reflected, as before.

To the doctrine concerning the materiality of light, and its amazing velocity, several objections have been made; of which the most considerable is, that as rays of light are continually passing in different directions from every visible point, they must necessarily interfere with each other in such a manner, as entirely to confound all distinct perception of objects, if not quite to destroy the whole sense of seeing: not to mention the continual waste of substance which a constant emission of particles must occasion in the luminous body, and thereby since the creation must have greatly diminished the matter in the sun and stars, as well as increased the bulk of the earth and planets by the vast quantity of particles of light absorbed by them in so long a period of time.

But it has been replied, that if light were not a body but consisted in mere pression or pulsion, it could never be propagated in right lines, but would be continually inflected ad umbram. Thus Sir I. Newton: "A pressure on a fluid medium, i. e. a motion propagated by such a medium, beyond any obstacle, which impedes any part of its motion, cannot be propagated in right lines, but will be always inflecting and diffusing itself every way, to the quiescent medium beyond that obstacle. The power of gravity tends downwards; but the pressure of water arising from it tends every way with an equable force, and is propagated with equal ease and equal strength, in curves, as in strait lines. Waves, on the surface of the water, gliding by the extremes of any very large obstacle, inflect and dilate themselves, still diffusing gradually into the quiescent water beyond that obstacle. The waves, pulses, or vibrations of the air, wherein sound consists, are manifestly inflected, though not so considerably as the waves of water; and sounds are propagated with equal ease, through crooked tubes, and through straight lines; but light was never known to move in any curve, nor to inflect itself ad umbram."

It must be acknowledged, however, that many philosophers, both English and foreigners, have recurred to the opinion, that light consists of vibrations propagated from the luminous body, through a subtle etherial medium.

The ingenious Dr. Franklin in a letter dated April 23, 1752, expresses his dissatisfaction with the doctrine, that light consists of particles of matter continually driven off from the sun's surface, with so enormous a swiftness. "Must not," says he, "the smallest portion conceivable, have, with such a motion, a force exceeding that of a 24 pounder discharged from a cannon? Must not the sun diminish exceedingly by such a waste of matter; and the planets, instead of drawing nearer to him, as some have feared, recede to greater distances through the lessened attraction? Yet these particles, with this amazing motion, will not drive before them, or remove, the least and slightest dust they meet with; and the sun appears to continue of his ancient dimensions, and his attendants move in their ancient orbits." He therefore conjectures that all the phenomena of light may be more properly solved, by suppos-posing all space filled with a subtle elastic fluid, which is not visible when at rest, but which, by its vibrations, affects that fine sense in the eye, as those of the air affect the grosser organs of the ear; and even that different degrees of the vibration of this medium may cause the appearances of different colours. Franklin's Exper. and Observ. 1769, pa. 264. To this hypothesis of vibrations there is a very strong objection, to which, though it has often been attempted, no satisfactory answer has been given; for, according to this hypothesis, light would not only spread itself in a direct line, but its motion would be transmitted in every direction like that of sound, and would con-

vey the impression of luminous bodies in the regions of space beyond the obstacles that intervene to stop its progress. Accordingly we should have no night; and in total eclipses of the sun, that disappearance of light that changes the brightness of a fine day into complete darkness would never occur.

The celebrated Euler has maintained the same hypothesis, in his Theoria Lucis et Colorum. In the summary of his arguments against the common opinion, recited in Acad. Berl. 1752, pa. 271, besides the objections above-mentioned, he doubts the possibility, that particles of matter, moving with the amazing velocity of light, should penetrate transparent substances with so much ease. In whatever manner they are transmitted, those bodies must have pores, disposed in right lines, and in all possible directions, to serve as canals for the passage of the rays: but such a structure must take away all solid matter from those bodies, and all coherence among their parts, if they do contain any solid matter.

Dr. Horsely, late Bp. of St. Asaph, took considerable pains to obviate the difficulties started by Dr. Franklin. Supposing that the diameter of each particle of light does not exceed one millionth of one millionth of an inch, and that the density of each particle is even three times that of iron, that the light of the sun reaches the earth in 7′, at the distance of 22919 of the earth's semidiameters, he calculates that the momentum or force of motion in each particle of light coming from the sun, is less than that in an iron ball of a quarter of an inch in diameter, moving at the rate of less than an inch in twelve thousand millions of millions of years. Hence he concludes, that a particle of matter, which probably is larger than any particle of light, moving with the velocity of light, has a force of motion, which, instead of exceeding the force of a 24 pounder discharged from a cannon, is almost infinitely less than that of the smallest shot discharged from a pocket-pistol, or less than any that art can create. He also thinks it possible, that light may be produced by a continual emission of matter from the sun, without any such waste of his substance as should sensibly contract his dimensions, or alter the motions of the planets, within any moderate length of time. In proof of this, he observes that, for the production of any of the phenomena of light it is not necessary that the emanation from the sun should be continual, in a strict mathematical sense, or without any interval; and likewise that part of the light which issues from the sun, is continually returned to him by reflection from the planets, as well as other light from the suns of other systems. He proceeds, by calculation, to shew that in 385,130,000 years, the sun would loose but the 13232d part of his matter, and consequently of the gravitatiou towards him, at any given distance; which is an alteration much too small to discover itself in the motion of the earth, or of any of the planets. He farther computes that the greatest stroke which the retina of a common eye sustains, when turned directly to the sun in a bright day, does not exceed that which would be given by an iron shot, a quarter of an inch in diameter, and moving only at the rate of $16\frac{1}{6}$ inches in a year; whereas the ordinary stroke is less than the 2084th part of this. See Philosophical Transactions vol. 60 and 61.

In answer to the difficulty respecting the non-interference of the particles of light with each other, Mr. Melville observes (Edinb. Ess. vol 2.), there is probably no physical point in the visible horizon, that does not send rays to every other point, unless where opaque bodies interpose. Light, in its passage from one system to another, often passes through torrents of light issuing from other suns and systems, without ever interfering, or being diverted from its course, either by it, or by the particles of that elastic medium, which it has been supposed by some is diffussed through all the mundane space. To account for this fact, he supposes that the particles of light are incomparably rare, even when they are the most dense, or that their diameters are incomparably less than their distance from one another: which obviates the objection urged by Euler and others against the materiality of light, from its influence in disturbing the freedom and perpetuity of the celestial motions. Boscovich and some others solve the difficulty concerning the non-interference of the particles of light, by supposing that each particle is endued with an insuperable impulsive force; but in this case, their spheres of impulsion would be more likely to interfere, and on that account they be more liable to disturb one another.

M. Canton shews (Philos. Trans. vol, 58, p. 344), that the difficulty of the interference will vanish, if a very small portion of time be allowed between the emission of every particle and the next that follows in the same direction. Suppose, for instance, that a lucid point in the sun's surface emits 150 particles in a second of time, which, he observes, will be more than sufficient to give continual light to the eye, without the least appearance of intermission; yet still the particles of such a ray, on account of their great velocity, will be more than 1000 miles behind each other, a space sufficient to allow others to pass in all directions without any perceptible interruption. And if we adopt the conclusions drawn from the experiments on the duration of the sensations excited by light, by the chevalier D'Arcy, in the Acad. Scienc. 1765, who states it at the 7th part of a second, an interval of more than 20,000 miles may be admitted between every two successive particles.

The doctrine of the materiality of light is farther confirmed by those experiments, which shew, that the colour and inward texture of some bodies are changed by being exposed to the light.

*Of the Momentum, or Force, of the Particles of Light.* Some writers have attempted to prove the materiality of light, by determining the momentum of its component particles, or by shewing that they have a force so as, by their impulse, to give motion to light bodies. M. Homberg, Ac. Par. 1708, Hist. pa. 25, imagined that he could not only disperse pieces of amianthus, and other light substances, by the impulse of the solar rays, but also that by throwing them upon the end of a kind of lever, connected with the spring of a watch, he could make it move sensibly quicker; from which, and other experiments, he inferred the weight of the particles of light. And Hartsoecker made pretensions of the same nature. But M. Du Fay and M. Mairan made other experiments of a more accurate kind, without the effects which the former had imagined, and which even proved that the effects mentioned by them were owing to currents of heated air produced

by the burning glasses used in their experiments, or some other causes which they had overlooked.

However, Dr. Priestly informs us, that Mr. Michell endeavoured to ascertain the momentum of light with still greater accuracy, and that his endeavours were not altogether without success. Having found that the instrument he used, acquired, from the impulse of the rays of light, a velocity of an inch in a second of time, he inferred that the quantity of matter contained in the rays falling upon the instrument in that time, amounted to no more than the 12 hundred millionth part of a grain. In the experiment, the light was collected from a surface of about three square feet; and as this surface reflected only about the half of what fell upon it, the quantity of matter contained in the solar rays, incident upon a square foot and a half of surface, in a second of time, ought to be no more than the 12 hundred millionth part of a grain, or upon one square foot only, the 18 hundred millionth part of a grain. But as the density of the rays of light at the surface of the sun, is 45000 times greater than at the earth, there ought to issue from a square foot of the sun's surface, in one second of time, the 40 thousandth part of a grain of matter; that is, a little more than two grains a day, or about 4,752,000 grains, which is about 670 pounds avoirdupois, in 6000 years, the time since the creation; a quantity which would have shortened the sun's semidiameter by no more than about 10 feet, if it be supposed of no greater density than water only.

The expansion or extension of any portion of Light, is inconceivable. Dr. Hook shews that it is as unlimitted as the universe; which he proves from the immense distance of many of the fixed stars, which only become visible to the eye by the best telescopes. Nor, adds he, are they only the great bodies of the sun or stars that are thus liable to disperse their light through the vast expanse of the universe, but the smallest spark of a lucid body must do the same, even the smallest globule struck from a steel by a flint.

The intensity of different lights, or of the same light in different circumstances, affords a curious subject of speculation. M. Bouguer, Traité d'Optique, found that when one light is from 60 to 80 times less than another, its presence or absence will not be perceived by an ordinary eye; that the moon's light, when she is 19° 16′ high above the horizon, is but about $\frac{1}{3}$ of her light at 66° 11′ high; and when one limb just touched the horizon, her light was but the 2000th part of her light at 66° 11′ high; and that hence light is diminished in the proportion of 3 to 1 by traversing 7469 toises of dense air. He found also, that the centre of the sun's disc is considerably more luminous than the edges of it; whereas both the primary and secondary planets are more luminous at their edges than near their centres: that, farther, the light of the sun is about 300,000 times greater than that of the moon; and therefore it is no wonder that philosophers have had so little success in their attempts to collect the light of the moon with burning-glasses; for, should one of the largest of them even increase the light 1000 times, it will still leave the light of the moon in the focus of the glass, 300 times less than the intensity of the common light of the sun.

Dr. Smith, in his Optics, vol. 1, pa. 29, thought he had proved that the light of the full moon would be only the 90,900th part of the full day light, if no rays were lost at the moon. But Mr. Robins, in his Tracts, vol. 2, pa. 225, shews that this is too great by one half. And Mr. Michell, by a more easy and accurate mode of computation, found that the density of the sun's light on the surface of the moon is but the 45,000th part of the density at the sun; and that therefore, as the moon is nearly of the same apparent magnitude as the sun, if she reflected to us all the light received on her surface, it would be only the 45,000th part of our day light, or that which we receive from the sun. Admitting therefore, with M. Bouguer, that the moon light is only the 300,000th part of the day or sun's light, Mr. Michell concludes that the moon reflects no more than between the 6th and 7th part of what she receives.

Professor Leslie, on the contrary, says, 'The light of the moon has the opposite character of excessive debility. The action of her rays on the photometer is quite imperceptible: nor could I render it visible, even by collecting them in the focus of a large burning glass. But I was enabled to form some estimate, by an indirect mode of comparison. I selected a small table of logarithms on which I could barely read the figures, by the light of the full moon: on retiring gradually backwards from a wax candle set to burn in a darkened room, I found the figures now become indistinct, beyond the distance of 15 feet. The force of the light received from the candle must have been only the 1350th part of a degree, for

$$\tfrac{1}{6} \times \left(\tfrac{1}{15}\right)^2 = \tfrac{1}{6 \times 225} = \tfrac{1}{1350};$$

and consequently if the flame had been contracted to the same apparent magnitude as the moon, this measure would have been diminished still 16 times more, and hence reduced to the 21,600th part of a degree. But the illuminating power of the sun, at the same altitude, is 70 degrees, and therefore exceeds that of the moon, in the ratio of 70 × 21,600 to 1; or, in round numbers, it is one hundred and fifty thousand times greater.

'This estimate is double what has been assigned by the celebrated Bouguer; and my respect for the conclusions of that able observer has induced me, where the limit was dubious, to lean more to the side of defect than excess. If I have erred therefore, I presume it is in representing the lunar illumination rather too small than too large. But neither of these computations will agree with the current opinion, that the moon derives her light merely from the sun. In fact, if the moon reflected and dispersed in every direction the whole of the light which she receives from the sun, it would, before it reached us, be spread over the concavity of a sphere equal to the lunar orbit. But this orbit having its diameter about 224 times that of the moon, and the surface of a sphere being equal to four of its great circles; the secondary light which would reach the earth must be attenuated not less than two hundred thousand times, for $4\,(224)^2 = 200{,}704$. Such perfect reflection, however, cannot be admitted. If we examine the face of the moon with a good telescope, we discern round spots of extraordinary brightness, and perceive large spaces which are remarkably obscure. It is evident then, that but a very small part of the incident light must be reflected, the rest being absorbed. The quantity of reflection from paper, plaster, and other white rough surfaces, according to Bouguer himself, constitutes only the 150th part of the whole incidence. If the exterior crust of the moon resembled, therefore, any earthy body with which we

are acquainted, her pale borrowed light would be at least one hundred times feebler than is actually observed. Hence I am disposed to think, that the rays of the moon are principally, if not entirely, discharged from her own mass, and that the lunar surface is of a nature analogous to the carbonate of barytes and other phosphorescent substances, which, after a partial calcination, are capable of being excited by the action of the solar rays to disengage their latent light.' (*Leslie on Heat*, pa. 451).

Sir I. Newton observes, that bodies and light act mutually on one another; bodies on light, in emitting, reflecting, refracting, and inflecting it; and light on bodies, by heating them, and putting their parts into a vibrating motion, in which heat principally consists. For all fixed bodies, he observes, when heated beyond a certain degree, to emit light, and shine; which shining &c. appears to be owing to the vibrating motion of their parts; and all bodies, abounding in earthy and sulphureous particles, if sufficiently agitated, emit light, which way soever that agitation be effected. Thus, sea water shines in a storm; quicksilver, when shaken in vacuo; cats or horses, when rubbed in the dark; and wood, fish, and flesh, when putrefied.

Light proceeding from putrescent animal and vegetable substances, as well as from glow-worms, is mentioned by Aristotle. And Bartholin mentions four kinds of luminous insects, two of which have wings: but in hot climates it is said they are found in much greater numbers, and of different species. Columna observes, that their light is not extinguished immediately on the death of the animal. The first distinct account that occurs of light proceeding from putrescent animal flesh, is that which is given by Fabricius ab Aquapendente in 1592, de Visione &c. pa. 45. And Bartholin gives and account of a similar appearance, which happened at Montpelier in 1641, in his treatise De Luce Animalium.

Mr. Boyle speaks of a piece of shining rotten wood, which was extinguished in vacuo; but upon re-admitting the air, it revived again, and shone as before; though he could not perceive that it was increased in condensed air. But in Birch's History of the Royal Society, vol. 2, pa. 254, there is an account of the light of a shining fish, which was rendered more vivid by putting the fish into a condensing engine. The fish called whitings were those commonly used by Mr. Boyle in his experiments: though in a discourse read before the Royal Society in 1681, it was asserted that, of all fishy substances, the eggs of lobsters, after they had been boiled shewn the brightest. Birch's Hist. vol. 2, pa. 70. In 1672 Mr. Boyle accidentally observed light issuing from flesh meat; and, among other remarks on this subject, he observes that extreme cold extinguishes the light of shining wood; probably because extreme cold checks the putrefaction, which is the cause of the light. The shell fish called Pholas, is remarkable for its luminous quality. The luminousness of the sea has been also a subject of frequent observation. See *Phosphorus*, *Putrefaction*, and the latter part of this article.

Mr. Hawksbee, and many writers on the subject of electricity since his time, have produced a great variety of instances of the artificial production of light, by the attrition of bodies naturally not luminous; as of amber rubbed on woollen cloth in vacuo; of glass on woollen, of glass on glass, of oyster shells on woollen, and of woollen on woollen, all in vacuo. See ELECTRICITY, &c.

*Of the Attraction of Light.* That the particles of light are attracted by those of other bodies, is evident from numerous experiments. This phenomenon was observed by Sir I. Newton, who found, by repeated trials, that the rays of light, in their passage near the edges of bodies, are diverted out of the right lines, and always inflected or bent towards those bodies, whether they be opaque or transparent, as species of metals, the edges of knives, broken glasses, &c. See INFLECTION and RAYS. The curious observations that had been made on this subject by Dr. Hook and Grimaldi, led Sir I. Newton to repeat and diversify their experiments, and to pursue them much farther than they had done. For a particular account of his experiment and observations, see his treatise on Optics, pa. 293 &c.

This action of bodies on light is found to exert itself at a sinsible distance, though it always increases as the distance is diminished; as appears very sensibly in the passage of a ray between the edges of two thin planes at different apertures; which is attended with this peculiar circumstance, that the attraction of one edge is encreased as the other is brought nearer it. The rays of light, in their passage out of glass into a vacuum, are not only inflected towards the glass, but if they fall too obliquely, they will revert back again to the glass, and be totally reflected. Now the cause of this reflection cannot be attributed to any resistance of the vacuum, but must be entirely owing to some force or power in the glass, which attracts or draws back the rays as they were passing into the vacuum. And this appears farther from hence, that if we wet the back surface of the glass with water, oil, honey, or a solution of quicksilver, then the rays which would otherwise have been reflected, will pervade and pass through that liquor; which shews that the rays are not reflected till they come to that back surface of the glass, nor even till they begin to go out of it; for if, at their going out, they fall into any of the aforesaid mediums, they will not then be reflected, but will persist in their former course, the attraction of the glass being in this case counterbalanced by that of the liquor.

Mr. Maraldi prosecuted experiments similar to those of Sir I. Newton on inflected light. And his observations chiefly respect the inflection of light towards other bodies, by which their shadows are partially illuminated. *Acad. Paris.* 1723, Mem. pa. 159. See also *Priestley's Hist.* pa. 521 &c.

M. Mairan, without attempting the discovery of new facts, endeavoured to explain the old ones, by the hypothesis of an atmosphere surrounding all bodies; and consequently two reflections and refractions of light that impinges upon them, one at the surface of the atmosphere, and the other at the surface of the body itself. This atmosphere he supposed to be of a variable density and refractive power, like the air.

M. Du Tour succeeded Mairan, and imagined that he could account for all the phenomena by the help of an atmosphere of an uniform density, but of a less refractive power than the air surroundiug all bodies. Du Tour also varied the Newtonian experiments, and discovered more than three fringes in the colours produced by the inflection of light. He farther concludes that the refracting atmosphere, surrounding all kinds of bodies, are of the same size; for when he used a great variety of substances, and of different

sizes too, he always found coloured streaks of the same dimensions. He also observes, that his hypothesis contradicts an observation of Sir I. Newton, viz. that those rays are the most inflected which pass the nearest to any body. *Mem. de Math. &c. de Phys.* vol. 5, pa. 650, or *Priestley's Hist.* pa. 531.

M. Le Cat found that objects sometimes appear magnified by means of the inflection of light. Looking at a distant steeple, when a wire, of a less diameter than the pupil of his eye, was held pretty near to it, and drawing it several times between that object and his eye, he was surprised to find that every time the wire passed before his eye, the steeple seemed to change its place, and some hills beyond the steeple seemed to have the same motion, just as if a lens had been drawn between them and his eye. This discovery led him to several others depending on the inflection of the rays of light. Thus, he magnified small objects, as the head of a pin, by viewing them through a small hole in a card; so that the rays which formed the image must necessarily pass so near the circumference of the hole, as to be attracted by it. He exhibited also other appearances of a similar nature. *Traité des Sens,* pa. 299. *Priestley, ubi supra,* pa. 537.

*Reflection and refraction of Light.* From the mutual attraction between the particles of light and other bodies, arise two other grand phenomena, besides the inflection of light, which are called the reflection and refraction of light. It is well known that the determination of bodies in motion, especially elastic ones, is changed by the interposition of other bodies in their way: thus also light, impinging on the surfaces of bodies, should be turned out of its course, and beaten back or reflected, so as, like other striking bodies, to make the angle of its reflection equal to the angle of incidence. This, it is found by experience, light does; and yet the cause of this effect is different from that just now assigned: for the rays of light are not reflected by striking on the very parts of the reflecting bodies, but by some power equally diffused over the whole surface of the body, by which it acts on the light, either attracting or repelling it, without contact: by which same power, in other circumstances, the rays are refracted; and by which also the rays are first emitted from the luminous body; as Newton abundantly proves by a great variety of arguments. See Reflection, Refraction, Optics.

Whence comes the light afforded by ignited bodies? whether it have been previously imbibed by them? whether the commencement of ignition be distinctive of the same temperature in all bodies? whether the great planetary sources of light be bodies in a state of combustion, or merely luminous upon principles very different from any which our experiments can point out? whether the momentum of the particles of light, or their disposition for chemical combination, be the most effectual in the changes produced by its agency?—these, and numerous other interesting questions, must be left for future research and investigation. See Combustion.

The production of light by inflammation is an object of great importance to society at large, as well as to the chemist. It appears to arise immediately from the strong ignition of a body while rapidly decomposing. Most solid bodies in combustion are kept, partly from a want of the access of air, and partly from the vicinity of conducting bodies, at a low degree of ignition. But when vapours rapidly escape into the air, it may, and does frequently happen, that the combustion, instead of being carried on merely at the surface of the mass, penetrates to a considerable depth within, and from this, as well as from the imperfect conducting power of the surrounding air, a white heat, or very strong ignition, is produced. The effect of lamps and candles depends upon these considerations. A combustible fluid, most commonly of the nature of fat oil, is put in a situation to be absorbed between the filaments of cotton, linen, fine wire, or asbestos. The extremity of this fibrous substance, called the wick, is then considerably heated. The oil evaporates, and its vapour takes fire. In this situation the wick, being enveloped with flame, is kept at such a temperature, that the oil continually boils, is evaporated; burns, and by these means keeps up a constant flame. Much of the perfection of this experiment depends on the nature, quantities, and figure of the materials employed.

Light, (*Chemical Properties of.*) Of whatever this substance may consist, or however it may be produced, we see abundant reason to convince us that it is a very important agent in many of the great chemical changes that are taking place in the visible world; while even in the laboratory its effects are often demonstrable in a multiplicity of experiments.

To ascertain in some degree (for we have still much ignorance upon this subject) the chemical properties of light, we shall first observe that the rays emitted from the sun, are not simple as was formerly conceived, but consist of three distinct kinds, each of them differently refrangible; colorific or those producing the effect of light and colours, calorific, or those producing heat, and deoxydizing, or those which have a tendency to reduce metallic oxyds to their metalline state. Into some classes of bodies the whole of these enter, into others the first, second or third kind alone. From some classes of bodies they are either severally or generally extricated without alteration; and with others, the whole or some particular kind combines, and constitutes one of their component parts.

Whether any one of these three distinct kinds of rays is capable of being generated and secreted by other bodies is perhaps doubtful: but that the light which many substances emit is derived *ab extra* is evident from the experiments of father Beccaria, and several other philosophers, by which it appears that these only become luminous after having been for a long time exposed to the light; and lose their luminous property soon after they have been deprived of it. We are also indebted to Mr. Canton for some very interesting experiments on this subject, and for discovering a composition which possesses this property in a remarkable degree. He calcined some oyster shells in a good coal fire for half an hour and then pounded and sifted the purest part of them, three parts of this powder was mixed with one part of the flower of sulphur and rammed into a crucible, which was kept red hot for an hour. The brightest parts of the mixture were then scraped off and kept for use in a dry place well stopped. When this composition is exposed for a few seconds to the light it becomes sufficiently luminous to enable a person to distinguish the hour on a watch by it. After some time it ceases to shine but recovers this property on being again exposed to the light. See Phosphorus, and Pyrophorus.

But light not only enters into bodies, it also

combines with them, and constitutes one of their compound parts. Other experiments of Mr. Canton, and more recent ones of Dr. Hulme very sufficiently prove this. It has been long known that different kinds of meat and of fishes on the point of putrefaction become luminous in the dark, and of course give out light. This is the case in particular with the whiting, the herring, and the mackrel. When four drams of either of these are put into a phial containing two ounces of sea-water, or of pure water, holding in solution half a dram of common salt, or two drams of sulphat of magnesia, if the phial be put into a dark place, a luminous ring appears on the surface of the liquid within three days, and the whole liquid, when agitated, becomes luminous and continues in that state for some time. When these liquids are frozen the light disappears, but is again emitted as soon as they are thawed. A moderate heat increases the luminousness, but a boiling heat extinguishes it altogether. The light is extinguished also by water, lime-water, water impregnated with carbonic acid gass, or sulphurated hydrogen gass, fermented liquors, spirituous liquors, acids, alkalies, and water saturated with a variety of salts, as sal ammoniac, common salt, sulphat of magnesia; but the light appears again when these solutions are diluted with water. This light produces no sensible effect on the thermometer. Light therefore is a component part of such substances, and perhaps the first that makes its escape when they are beginning to be decomposed.

Not unfrequently, however, the light absorbed and afterwards emitted by bodies is emitted not generally but by a decomposition of its calorific rays; and often only a particular kind of ray is absorbed while the rest are reflected. Hence the cause of the different colours of bodies: such colours depending upon the affinity of particular bodies for particular rays, and their want of affinity for others.

Hence the absorption of light by bodies produces, very sensible changes in them, and changes that operate below their surface. Plants for instance may be made to vegetate in the dark tolerably well: but in such case not only is their surface white or colourless, but they have scarcely any taste, and contain but a very small proportion of combustible matter. In a very short time, however, after exposure to light their colour becomes green, their taste is rendered much more intense, and the quantity of combustible matter is considerably increased. Lovage, mint, carraways, tansy and many other plants have been the subject of such experiments, by being buried long in deep mines, when it has been found that they have uniformly in process of time so completely lost their colour, aroma, and in some instances the very form of their leaves, as to render a stranger to the fact, incapable of classifying or identifying them: yet upon re-exposure to the light they have again exhibited their peculiar characters.

Light has also a considerable influence in the germination of seeds. Ingenhouse found that seeds always germinate faster in the dark than when exposed to the light. His experiments were repeated by Sennebier with equal success: but the Abbé Bertholin has objected to this conclusion and affirmed that the difference adverted to proceeded not from difference in the quantity of light but of moisture; the moisture evaporating much faster from seeds in the light than from those in the shade. Yet Sennebier repeated his experiments with every possible attention to equality of moisture, and still the same result followed. We may safely conclude therefore that light, though highly useful to the subsequent growth and perfection of vegetables, retards germination. Sanpear, however, has lately advanced and upon strong grounds that light is merely injurious to germination in consequence of the heat it produces: for when the direct rays of the sun were intercepted, though light was admitted, the germination of seeds was not retarded sensibly.

Another very remarkable instance of the agency of light is in the reduction of the metallic oxyds. The red oxyds of mercury and lead become much lighter when exposed to the sun; and the white salts of silver called luna cornea, in the same situation, soon become black, and the oxyd is reduced. The oxyd of gold may be reduced in the same manner. This change occurs without requiring the least increase of temperature, or in any way being affected by heat or cold, and it occurs equally well in close as in open vessels, and only in the surface immediately exposed to the light. Light then has the property of separating oxygen from the oxyds.

This reduction of metallic oxyds was till lately supposed to be produced by the calorific rays of light, but Dr. Wollaston, M. M. Ritter and Bortmann have lately ascertained that muriat of silver is blackened most rapidly, when it is placed beyond the violet ray (the ray which was formerly conceived to be the most powerful in producing this effect) and entirely out of the prismatic spectrum. Hence it follows that the change is produced, not merely by the calorific rays, but by rays which are incapable of rendering objects visible; rays which are more refrangible than the calorific as they extend beyond the violet end of the spectrum. And hence, independantly of the calorific and colorific, we obtain knowledge of a third set of rays; and perhaps the greater number of the chemical changes produced on bodies by solar light is owing to this last set of rays, which, from its first noticed effect has been denominated, as we have already observed *deoxydizing*. See Caloric, Combustion and Heat.

That the calorific and illuminating or colorific rays of the sun are not the same was first determined by Dr. Herschell, it having been only conjectured before, in consequence of his observing that the most refrangible rays have the least heating power, and that the heating power gradually increases as the refrangibility diminishes: whence he was led to suspect that the heating power does not stop at the end of the visible spectrum, but is continued beyond it at the red extremity. He placed therefore the thermometer by which he had ascertained this difference of power beyond the boundary of the red ray, but still in the line of the spectrum, and it rose still higher than it had done when exposed to the red ray which possesses the greatest heating power of all the coloured rays. On shifting the thermometer still further it continued to rise, and the rise did not reach its maximum till the thermometer was half an inch beyond the utmost extremity of the red ray. When shifted still further it sunk a little; but the power of heating was sensible at the distance of an inch and a half from the red ray. These experiments have been since fully confirmed by other philosophers; and it hence follows that there are rays emitted from the sun

which produce heat, but have not the power of illuminating, and that these are the rays which produce the greatest quantity of heat. Consequently caloric is emitted from the sun in rays, and the rays of caloric are not the same with the rays of light.

Among other anomalous effects of light we may observe that it tends strongly to decompose liquid oxymuriatic acid, experience having shown that to preserve it long it must be kept in a dark place or in opake bottles. It renders pale nitric acid again ruddy and fuming to a certain degree, even though inclosed in vessels hermetically sealed. Many of the vegetable acid salts, particularly the acetits, appear to be strongly affected by it, to become brown, turbid, and at last considerably decomposed. A very great proportion of the natural dyes and colouring materials from the vegetable and animal kingdoms (when removed from their natural sources) instead of being heightened by exposure to light, have their brilliance of hue much impaired, and often entirely faded, whence the necessity of keeping fine tapestry, carpets, pictures, &c. as much as possible out of the sun-shine. The mode in which light operates here has been theorised upon, but nothing more, for it is still totally unknown.

The crystallization of saline substances, takes place much more freely towards the side in which light is chiefly admitted, than towards the opposite side, and not unfrequently the whole mass will radiate towards the luminous point.

All solids and dense liquids (not evaporable) become luminous at a certain point, which temperature is therefore described usually as being a red heat. Gasses however are not luminous at a very high heat, at which solids immersed in them readily glow with a very bright red. Whether any intensity of heat could communicate such redness to gasses is doubtful.

Light is obtained from the sun and stars: by combustion, by heat, by friction, and by percussion. See the article Caloric. It is also emitted by certain bodies during decomposition, and by others in full vigour. See Luminous Animals and Phosphorus.

Light. In the manage, a horse is said to be light that is swift in his paces. We likewise call a horse light that is well made, though neither swift nor active; for, in this last expression, we consider only the shape and make of a horse, without regard to his qualities.

Light upon the hand. A phrase applied to a horse that has a good mouth, and does not rest too heavily on the bit.

Light-Bellied; light-carcassed. A term applied to a horse that has flat, narrow, and contracted sides, which makes the flanks turn up like that of a greyhound.

*To* LIGHTEN. *v. n.* (lıꞇ, lıᵹꞇ, Saxon.) 1. To flash, with thunder (*Shakspeare*). 2. To shine like lightning (*Shakspeare*). 3. To fall; to light (from *light.*) *Com. Pr.*

*To* LI'GHTEN. *v. a.* (from *light.*) 1. To illuminate; to enlighten (*Davies*). 2. To exonerate; to unload (*Jonah*). 3. To make less heavy (*Milton*). 4. To exhilarate; to cheer (*Dryden*).

LI'GHTER. *s.* (from *light*, to make *light.*) A heavy boat into which ships are lightened or unloaded (*Pope*).

LI'GHTERMAN. *s.* (*lighter* and *man.*) One who manages a lighter (*Child*).

LI'GHTFI'NGERED. *a.* (*light* and *finger.*) Nimble at conveyance; thievish.

LI'GHTFOOT. *a.* (*light* and *foot.*) Nimble in running or dancing; active (*Spenser*).

LI'GHTFOOT. *s.* Venison. A cant word.

LI'GHTFORTIA. In botany a genus of the class pentandria, order monogynia. Calyx five-leaved; corol five-petalled; stamens standing on five valves closing the bottom of the corol; stigma from five to three-cleft; capsule from three to five-celled, from three to five valved, partly superior. Two species both natives of the Cape: one of which, however, L. subulata is supposed to be the same as the campanula capillacea. See Campanula.

LIGHTHE'ADED. *a.* (*light* and *head.*) 1. Unsteady; loose; thoughtless, weak (*Clar.*) 2. Delirious; disordered in the mind by disease.

LIGHTHE'ADEDNESS. *s.* Deliriousness; disorder of the mind.

LIGHTHEA'RTED. *a.* (*light* and *heart.*) Gay; merry; airy; cheerful.

Light-horse, an ancient term in our English customs, signifying an ordinary cavalier, or horseman lightly armed, and so as to enter a corps or regiment; in opposition to the men at arms, who were heavily accoutred, and armed at all points.

Light-house, a building erected upon a cape or promontory on the sea-coast, or upon some rock in the sea, and having on its top in the night-time a great fire, or light formed by candles, which is constantly attended by some careful person, so as to be seen at a great distance from the land. It is used to direct the shipping on the coast. that might otherwise run ashore, or steer an improper course when the darkness of the night and the uncertainty of currents, &c. might render their situation with regard to the shore extremely doubtful. Lamp-lights are, on many accounts, preferable to coal-fires or candles; and the effect of these may be increased by placing them either behind glass-hemispheres, or before properly disposed glass or metal reflectors, which last method is now very generally adopted.

In the supplement to the Encyclopedia Brittannica, under the word Reflector, it is stated that "Mr. Thomas Smith, tin-plate-worker, Edinburgh, seems to have conceived the idea of illuminating light houses by means of lamps and reflectors, instead of coal-fires, without knowing that something of the same kind had been long used in France; he has therefore all the merit of an inventor, and what he invented, he has carried to a high degree of perfection."

The writer of this article has certainly been misinformed, for reflectors, such as he describes, were invented by Mr. Ezekiel Walker, of Lynn Regis, they were also made, and fixed up, under his direction, in a light-house on the coast of Norfolk, in the

year 1782. And in the year 1787, at the request of the trustees appointed by act of parliament for erecting four light-houses on the northern parts of Great Britain, he instructed the above-mentioned Mr. Thomas Smith, in this method of constructing light-houses.

The parabolic moulds used by Mr. Walker, and Mr. Smith, are from 3 to 5 or 6 feet in diameter; and in the centre or apex of each is placed a long shallow lamp of tin-plate, filled with white oil. In each lamp are six cotton wicks, almost contiguous to each other, which are so disposed as to burn without trimming for about six hours. The light of these is reflected from each mirror spread over the concave surface, and is thus multiplied, as it were, by the number of mirrors. The stucco moulding is covered on the back with tin plate, from which a tube, immediately over the lamp proceeds to the roof of the light room, and serves as a funnel, through which the smoke escapes without sullying the faces of the mirrors. The light-room is a cupola or lantern of from eight to twelve sides, composed entirely of glass, fixed in cast iron frames or sashes, and roofed with copper. On circular benches passing round the inside of this lantern, at about eighteen inches from the glass frames, are placed the reflector with their lamps, so as that the concave surfaces of two or three of the reflectors front every point of the compass, and throw a blaze of light in all directions. In the roof immediately over the centre of the room is a hole, through which pass all the funnels already mentioned, and which serves likewise to admit fresh air to the lamps. This light-room is firmly fixed on the top of a round tower, so as to be immoveable by the weather; and the number of the reflectors, and the height of the tower, are less or greater according as it is the intention that the light should be seen at a less or a greater distance.

A man judging from mere theory would be very apt to condemn light-houses of this kind; because the firmest building shakes in a violent storm, and because such shaking, he might think, would sometimes throw the whole rays of light into the air, and thus mislead the bewildered seamen. This opinion, we know, was actually, entertained of them by one of the profoundest philosophers and most scientific mechanicians of the age. Experience, however, convinced him, as well as the public at large, that such apprehensions are groundless, and that light-houses with lamps and reflectors are, in every point of view, preferable to those with fires burning in the open air. They are supported at much less expence; their light is more brilliant, and seen at a greater distance, whilst it can never be obscured by smoke, or beaten down on the lee side by a violent gust of wind; and what is perhaps of still greater importance, the reflectors with their lamps may be so variously placed, that, one light-house cannot be mistaken for another. If we add to all this, that the lamps do not stand in need of trimming so often as open fires require fuel, and that the light-man is never exposed either to cold or to wet by attending to his duty, we must be convinced that light-houses with reflectors are much less liable to be neglected in stormy weather than those with open fires, and that this circumstance alone would be enough to give the former a preference, almost incalculable, over the latter. For more on the subject of Light-houses. See EDDYSTONE.

LIGHTLE'GGED. *a.* (*light* and *leg.*) Nimble; swift (*Sidney*).

LI'GHTLESS. *a.* Wanting light; dark.

LI'GHTLY. *ad.* (from *light.*) 1. Without weight (*Ben Jonson*). 2. Without deep impression (*Prior*). 3. Easily; readily; without difficulty; of course (*Hooker*). 4. Without reason (*Taylor*). 5. Without dejection; cheerfully (*Shaks.*) 6. Not chastely (*Swift*). 7. Nimbly, with agility; not heavily or tardily (*Dryden*). 8. Gayly; airily; with levity.

LIGHTMI'NDED. *a.* (*light* and *mind.*) Unsettled; unsteady.

LI'GHTNESS. *s.* (from *light.*) 1. Want of weight; not heaviness (*Burnet*). 2. Inconstancy; unsteadiness (*Shakespeare*). 3. Unchastity; want of conduct in women (*Sid.*) 4. Agility; nimbleness.

LI'GHTNING *and Thunder.* See THUNDER.

LIGHTS. *s.* The lungs; the organs of breathing (*Hayward*).

LI'GHTSOME. *a.* (from light.) 1. Luminous: not dark; not obscure; not opake (*Raleigh*). 2. Gay; airy; having the power to exhilarate (*South*).

LI'GHTSOMENESS. *s.* (from *lightsome.*) 1. Luminousness; not opacity; not obscurity; not darksomeness (*Cheyne*). 2. Cheerfulness; merriment; levity.

LIGNEOUS ACID. Pyroligneous acid: Empyreumatic acid of wood. This is in reality nothing more than an empyreumatic acetous acid; and ought rather perhaps to be ranked under that genus than under a distinct article. To procure it, put into a large glass retort any quantity of shavings of any kind of wood, as box, guaiacum, or beech, so as to fill only one-eighth of it; as the material is apt to swell, adapt to it a large receiver, not closely luted, and heat it on a sand-bath: an extremely strong-smelling dark-coloured, empyreumatic acid liquor will ascend nearly equal to one-third of the weight of the wood. This acid of wood is obtained in a large quantity near London, from the preparation of charcoal for gunpowder by distilling wood in cast-iron cylinders. It stains wood indelibly, and the hands deeply.

All the acetous empyreumatic acids are capable of very considerable purification by very easy methods, and in proportion as

they become purer they lose their empyreuma, their peculiar taste and smell (and consequently their characteristic differences) till at last when brought into the most concentrated state by some of the methods by which vinegar is dephlegmated, they all exhibit the characters of acetous acid in so unequivocal a manner that no doubt can now be entertained of their identity.

The varieties in the empyreumatic vegetable acids, were long ago thought to be accidental, and they had been referred to a common origin of a vegetable nature: but it is to one of the many valuable series of experiments with which M. M. Fourcroy and Vauquelin have enriched the chemistry of organized bodies that we owe the complete elucidation of this question. Simple rectification or re-distillation in a very gentle heat, and stopping the process when the liquor at last comes over much coloured, will purify to a very great degree both the pyromneous and pyroligneous acids. The latter, by this process, from being a dark coffee colour, assumes the hue of very pale clear brandy. However on long exposure to light, it becomes brown again, for it retains its empyreumatic character more obstinately than the other acid. Charcoal newly burnt and powdered has a great effect in purifying all these acids; they may be either greatly distilled off it, or even merely filtered through a stratum of it. But the most effectual method of purification is by uniting these acids with lime at a fixed alkali, evaporating to dryness, and then expelling the acid by means of the sulphuric in the same manner as the concentrated vinegar is prepared. The acid vapour that rises in this process has now lost its empyreuma almost entirely; has both the strength and potent odour of radical vinegar; when united to potash forms acetited potash, which may be obtained white by repeated crystallization, or by charcoal-powder, and in short is perfect acetous acid.

The purified acid of wood has been employed by M. Goetling for the preparation of an acetous ether.

This acid is sometimes employed as an object for manufacture. That obtained from distilled charcoal for gun-powder, near London, is employed by calico-printers in forming the acetited iron, used as a mordant; as here the colour and smell of the acid are in no way detrimental.

Acids added to the watery decoction turn it yellow, but alkalis give it a deep purple colour, without its forming any precipitate. Alum added to the decoction causes a violet precipitation or lake, and the super-natant liquor also remains violet, and gives a fresh portion of lake on the affusion of an alkali. The salts of iron give an inky black with all the solutions of logwood, under the same circumstances as with galls, whence the presence of gallic acid in logwood is abundantly proved.

The solutions of tin form a very fine violet or plum-colour, with the decoctions of logwood, and totally precipitate the colouring matter, so that the supernatant liquor is quite clear and colourless.

Logwood is used for various purposes in dyeing: either to give its own natural purple (with several shades or variations according to the mordant used) or to heighten and improve the common black with iron and galls. In this latter method it is found to give a peculiar gloss and lustre, which renders it a very valuable dyeing material.

LI'GNEOUS. *a.* (*ligneus*, Latin.) Made of wood; wooden; resembling wood (*Grew*).

LIGNOSE. In botany (*lignosus.*) woody applied to the stem. Opposed to herbaceous.

LIGNUM. In botany, the wood, or woody part of the trunk. *Liber præcedentis anni, nunc exsuccus, induratus, agglutinatus.* The *liber*, or inner bark of the preceding year, deprived of its juice, hardened, and agglutinated.

LIGNUM AGALLOCHI VERI. See *Lignum aloes.*

LIGNUM ALOES. *Lignum agallochi veri. Lignum calambac. Lignum aspalathi. Xyloalœs.* The tree whose wood bears this name is not yet scientifically known. It is generally supposed to be the excoecaria agallocha of Linnéus; but this does not correspond altogether with the aloexylon of Loureiro who asserts it to be the latter. The first is a native of China, the second of Mysore. There is a third wood of the same kind and possessing the same marketable name, which is obtained from Mexico, but which has not been hitherto philologically arranged. That we obtain from China and Cochinchina is imported in small, compact, ponderous pieces, of a yellow rusty brown colour, with black or purplish veins, and sometimes of a black colour. It has a bitterish resinous taste, and a slight aromatic smell. It is used to fumigate rooms in eastern countries.

LIGNUM ASPALATHI. See LIGNUM ALOES.

LIGNUM CALAMBAC. See LIGNUM ALOES.

LIGNUM CAMPECHENSE, (*Campechensis*; so called because it was brought from Campeachy, in the bay of Honduras). *Lignum campechianum. Lignum sappan.* Logwood. The wood of this tree, *Hæmatoxylum campechianum* of Linnéus, is of a solid texture, and of a dark red colour. It is imported principally as a substance for dying, cut into junks and logs of about three feet in length: of these pieces the largest and thickest are preserved, as being of the deepest colour. Logwood has a sweetish subadstringent taste, and no remarkable smell; it gives a purplish red tincture both to watery and spirituous infusions, and tinges the stools, and sometimes the urine, of the same colour. It is employed medicinally as an adstringent and corroborant. In diarrhœas it has been found peculiarly efficacious, and has the recommendation of some of the first medical authorities; also in the latter stages of dysentery, when the

obstructing causes are removed; to obviate the extreme laxity of the intestines usually superinduced by the repeated injections. An extract is ordered in the pharmacopœias. See HŒMATOXYLUM.

LIGNUM INDICUM. See GUAIACUM.

LIGNUM MOLUCCENSE. See LIGNUM PAVANE.

LIGNUM NEPHRITICUM. Nephritic wood. The wood of the *Guilandina moringa; inermiis foliis sub-bipinnatis, foliis inferioribus ternatis* of Linnéus, which also affords the *nux bean*. It is brought from America in large, compact, ponderous pieces, without knots, the outer part of a whitish, or pale yellowish colour, the inner of a dark brown, or red. When rasped it gives out a faint aromatic smell. It is never used medicinally in this country, but stands high in reputation abroad, in difficulties of urine, nephritic complaints, and most disorders of the kidneys and urinary passages.

LIGNUM PAVANÆ. *Lignum pavanum. Lignum moluccense.* The wood of the *Croton tiglium; foliis ovatis glabris acuminatis serratis, caule arboreo* of Linnéus, which affords the *grana tiglii.* It is of a light spongy texture, white within, but covered with a greyish bark; and possesses a pungent, caustic taste, and a disagreeable smell. It is said to be useful as a purgative in hydropical complaints.

LIGNUM RHODIUM. See ROSEWOOD.

LIGNUM SANCTUM. See GUAIACUM.

LIGNUM SANTALI RUBRI. See SANTALIUM RUBRUM.

LIGNUM SAPPAN. See LIGNUM CAMPECHENSE.

LIGNUM SERPENTUM. The wood of the *Ophyoxilum serpentinum* of Linnéus. It is said to be an alexipharmic.

LIGNUM VITÆ, in botany. See GUAIACUM.

LIGULA. In zoology a genus of the class vermes; order intestina. Body linear, equal, long; the fore-part obtuse; the hind-part acute, with an impressed dorsal nature. Two species:

1. L. intestinalis. Body clear white and very narrow. Found in the intestines of the menganser and guillemot; about a foot long, and exactly resembling a piece of tape.

2. L. abdominalis. Body pale-ash and rather broad. Eight varieties from difference of habitation, being found in the abdomen of the loche, gudgeon, tench, crucian, dace, bleak, vimba and bream. These worms are traced chiefly in the mesentery, emaciating the fish they infest, and making them grow deformed; when they escape from the body they penetrate through the skin: they are sometimes solitary and sometimes gregarious, about half a line thick, and from six inches to five feet long.

LIGULATE, in botany, (from *ligula*, a strap; which some derive from *ligo*, to bind; others from *lingula* dimin. of *língua*, a tongue; the first from its office, the second from its shape) applied to the corol. *Ligulata corolla.* A ligulate or strap-shaped flower. A species of compound flower, in which the florets have their corollets flat, spreading out towards the end, with the base only tubular. *Cum corollulæ flosculorum omnes planæ, versus exterius latus expansæ sunt.* These are the *Semi flosculosi* or Semi-floscular flowers of Tournefort; and are comprised in the first division of the first order of Linnéus's nineteenth class, *Syngenesia Polygamia Æqualis.*

LIGURES, the inhabitants of Liguria.

LIGURIA, a country at the west of Italy, bounded on the east by the river Macra, on the south by part of the Mediterranean called the Ligustic sea, on the west by the Varus, and on the north by the Po. The commercial town of Genoa was anciently, and is now, the capital of the country. The origin of the inhabitants is not known. Liguria was subdued by the Romans, and its chief harbour now bears the name of Leghorn.

LIGUSTICÆ ALPES, a part of the Alps, which borders on Liguria, sometimes called Maritimi.

LIGUSTICUM. Lovage. In botany, a genus of the class pentandria, order digynia. Fruit oblong, three-ribbed on each side; flowers uniform; petals involute, entire; calyx five-toothed. Fourteen species: all European plants, three of them common to our own country. L. levisticum, a native of the Appenines, polyphyllous, the leaflets cut at the top, is still employed as a useful medicine in dyspaptic affections, and some other diseases, under the name of Levisticum, which see.

LIGUSTRUM, in botany, privet, a genus of the diandria monogynia class and order. Natural order of sepiariæ. Jasmineæ, Jussieu. Essential character: corolla four-cleft; berry four-seeded. There are three species, of which L. vulgare, common privet, is a shrub about six feet in height, branched, the bark of a greenish-ash colour, irregularly sprinkled, with numerous prominent points; branches opposite, the young ones flexible and purplish; leaves opposite, on short petioles, smooth on both sides; panicle about two inches in length, somewhat pyramidal; corolla white, but soon changes to a reddish-brown. Privet is found wild in most parts of Europe, and in Japan, in woods and hedges; it flourishes best in a moist soil.

LIKE. *a.* (lic, Saxon; *liik*, Dutch.) 1. Resembling; having resemblance (*Baker*). 2. Equal; of the same quantity (*Sprat*). 3. (for *likely.*) Probable; credible (*Bacon*). 4. Likely; in a state that gives probable expectations (*Shakspeare*).

LIKE quantities, or Similar quantities, in algebra, are such as are expressed by the same letters, to the same power, or equally repeated in each quantity; though the numeral co-efficient may be different: thus, $4a$ and $5a$ are like quantities; so also are $3z^2$ and $9z^2$; and likewise $5bdy^2$ $10bdy^2$. But $4a$ and $8b$ are not like quantities; nor are $4a$ and $4a^2$.

Like Signs, in Algebra, are either both affirmative or both negative.

Like figures, the same as Similar figures. All like figures have their homologous lines in the same ratio. Like plane figures are in the duplicate ratio, or as the squares of their homologous lines or sides; and like solid figures are in the triplicate ratio, or as the cubes of their homologous sides.

LIKE. *s.* 1. Some person or thing resembling another (*Shakspeare*). 2. Near approach; a state like to another state (*Raleigh*).

LIKE. *ad.* 1. In the same manner; in the same manner as (*Spenser. Philips*). 2. In such a manner as befits (*Samuel*). 3. Likely; probably (*Shakspeare*).

*To* LIKE. *v. a.* (lican, Saxon.) 1. To choose with some degree of preference (*Clarendon*). 2. To approve; to view with approbation, not fondness (*Sidney*). 3. To please; to be agreeable to (*Bacon*).

*To* LIKE. *v. n.* 1. To be pleased with: obsolete (*Hooker*). 2. To choose; to list; to be pleased (*Locke*).

LI'KELIHOOD. } *s.* (from *likely.*)
LI'KELINESS. }

1. Appearance; show; obsolete (*Shaksp.*). 2. Resemblance; likeness: obsolete (*Raleigh*). 3. Probability; verisimilitude; appearance of truth (*Hooker*).

LI'KELY. *a.* (from *like.*) 1. Such as may be liked; such as may please: obsolete (*Shakspeare*). 2. Probable; such as may in reason be thought or believed.

LI'KELY. *ad.* Probably; as may reasonably be thought (*Glanville*).

*To* LI'KEN. *v. a.* (from *like.*) To represent as having resemblance; to compare (*Milton*).

LI'KENESS. *s.* (from *like.*) 1. Resemblance; similitude (*Dryden*). 2. Form; appearance (*L'Estrange*). 3. One who resembles another (*Prior*).

LI'KEWISE. *ad.* (*like* and *wise.*) In like manner; also; moreover; too (*Arbuthnot*).

LI'KING. *a.* Plump; in a state of plumpness (*Daniel*).

LI'KING. *s.* (from *like.*) 1. Good state of body; plumpness (*Dryden*). 2. State of trial (*Dryden*). 3. Inclination (*Spenser*).

LILAC, in botany. See Syringa.

LILALITE, in mineralogy See Mica.

LILIA. In botany, the name of the third nation, tribe, or cast of vegetables, in Linnéus's *Regnum Vegetabile*, containing the patrician rank, eminent for their splendid flowers.

LILIACEOUS, in botany, applied to the corol: having six regular petals.

LILIACÆ. Liliaceous or lily-like plants. The name of one of Tournefort's classes. Also of the tenth order in Linnéus's Fragments of a Natural Method. They are divided among several, from nine to eleven, orders, in the *Ordines Naturales*, at the end of Linnéus's *Genera Plantarum.*—This fine natural class is to be found in the class *Hexandria* of Linnéus's Artificial System.

LILIED. *a.* (from *lily.*) Embellished with lilies (*Milton*).

LILIUM. Lily. In botany, a genus of the class hexandria, order monogynia. Corol six-petalled, campanulate, with a longitudinal, nectariferous groove from the middle to the base; capsule with the valves connected by cancelled hairs. Sixteen species, chiefly natives of Asia, a few of Europe and America. The following are the chief.

1. L. candidum. White lily. Leaves lanceolate, scattered, tapering to the base; flowers campanulate, glabrous within, sometimes nodding; the stem round or a little flat. A native of Syria. The root is an article in the Edinburgh pharmacopoeia: it is extremely mucilaginous, and is chiefly used, boiled in milk and water, in emollient and suppurating cataplasms.

2. L. bulbiferum. Orange lily. Leaves scattered, broader or narrower; corols campanulate, erect, rough within; generally yellow, but varying in colour. A native of Europe.

3. L. chalcedonicum. Scarlet martagon. Leaves linear-lanceolate, scattered; crowning the stem to its summit; flowers reflected; corols revolute dotted within. A native of Persia.

4. L. martagon. Purple martagon. Leaves whorled, ovate-lanceolate, flowers reflected; corols revolute. Another variety with the leaves, stalks and buds somewhat hairy; whorls distant. Dark purple flowers with black spots. Natives of Europe.

5. L. Camschatcense. Kamschatka lily. Leaves in whorls; flowers erect; corol campanulate; petals without claws. A native of Canada and Kamschatka. Its root called by the natives of Kamschatka, saranne, constitutes a considerable part of their food. They are gathered in August, dried in the sun and laid up for winter use. They are baked when wanted and then reduced to powder or flour, and serve instead of wheaten flour for bread; and are put into soups and other dishes. Our own travellers have generally been pleased with this article of diet in most of the forms in which it is dressed. To the Kamschadales it is of peculiar use as being most common when the coasting fishes are most scarce. Mice and other animals are equally provident of this vegetable with the human inhabitants of the country. Many of these also have their winter granaries well stored with its nutritious production.

All these species are bulbous-rooted, herbaceous, flowering perennials, rising with erect annual stalks three or four feet high, with corols uniformly beautiful, in some species superb, white red, scarlet, orange, purple and yellow. They are propagated both by seeds and by offsets. The seeds should be sown in the beginning of August in pots or boxes of light earth, and be placed in a situation where they may derive the benefit of the morning sun.

LILLO (George), an excellent dramatic writer, was born near Moorgate, in London, in 1693, where he pursued his business of a jeweller many years, with the fairest reputation. He was strongly attached to the Muses, and all his compositions tend to the promotion of virtue, morality, and religion. Mr. Lillo, in pursuing his aim, made a happy choice of his subject. He does not introduce kings and heroes on the stage; yet by exhibiting tragic scenes in common and domestic life, and representing the ruin of private families, by lust, avarice, and other vices, he raises the passions to an equal height, and exacts a tribute of tears from the audience. It is said, that when his George Barnewell first came upon the stage, many of the critics attended its first representation with the most unfavourable impressions; and the story being founded on an old ballad, they brought it with them, intending to make pleasant remarks and ludicrous comparisons between the ancient ditty, and the modern drama; but the merit of the play soon got the better of their contempt, and presented them scenes written so truly to the heart, that they dropped their ballads, and took out their handkerchiefs. Mr. Lillo wrote four other tragedies, The Christian Hero; Elmerick; Fatal Curiosity; and Arden of Feversham; and, dying in the year 1739, left behind him an excellent character. His works have been collected and published, with an account of his life, in two 12mo. volumes, by Mr. T. Davis.

LILLY (William), a noted English astrologer, born in Leicestershire, in 1602; where his father, not being able to give him more learning than common writing and arithmetic, he resolved to seek his fortune in London. He arrived in 1620, and lived four years as a servant to a mantua-maker in the parish of St. Clement Danes; but then moved a step higher, to the service of Mr. Wright, master of the Salters' company in the Strand, who not being able to write, Lilly, among other offices, kept his books. In 1627, when his master died, he paid his addresses to the widow, whom he married with a fortune of 1000l. Being now his own master, he followed the puritanical preachers; and, turning his mind to judicial astrology, became pupil to one Evans, a profligate Welsh parson, in that pretended art. Getting a MS. of the *Ars notitia* of Corn. Agrippa, with alterations, he drank in the doctrine of the magic circle, and the invocation of spirits, with great eagerness. He was the author of the Merlinus Anglicus junior; The Supernatural Sight; and, The White King's Prophecy. In him we have an instance of the general superstition and ignorance that prevailed in the time of the civil war between Charles I. and his parliament; for the king consulted this astrologer, to know in what quarter he should conceal himself, if he could escape from Hampton-court; and General Fairfax, on the other side, sent for him to his army, to ask him if he could tell by his art, whether God was with them and their cause? Lilly, who made his fortune by favourable predictions to both parties, assured the general that God would be with him and his army. In 1648, he published his Treatise of the three Suns seen the preceding winter; and also an astrological judgment upon a conjunction of Saturn and Mars. This year the council of state gave him in money 50l. and a pension of 100l. per annum, which he received for two years, and then resigned on some disgust. In June 1660, he was taken into custody by order of the parliament, by whom he was examined, concerning the person who cut off the head of King Charles I. The same year he sued out his pardon, under the great seal of England. The plague raging in London, he removed with his family to his estate at Hersham; and in October 1666, was examined before a committee of the House of Commons, concerning the fire of London, which happened in September that year. After his retirement to Hersham, he applied himself to the study of physic, and, by means of his friend Mr. Ashmole, obtained from Archbishop Sheldon a licence for the practice of it. A little before his death, he adopted for his son, by the name of Merlin junior, one Henry Coley, a taylor by trade: and at the same time gave him the impression of his almanack, after it had been printed for 36 years. He died in 1681, of a dead palsy. Mr. Ashmole set a monument over his grave in the church of Walton-upon-Thames.—His "Observations on the Life and Death of Charles, late King of England," if we overlook the astrological nonsense, may be read with as much satisfaction as more celebrated histories; Lilly being not only very well informed, but strictly impartial. This work, with the Lives of Lilly and Ashmole, written by themselves were published, in one vol. 8vo. in 1774, by Mr. Burman.

LILY. In botany. See LILIUM.
——— *African Scarlet.* See AMARYLLIS.
——— *Asphodel.* See CRINUM HEMERACALLIS.
——— *Atamasco.* See AMARYLLIS.
——— *Belladonna.* See AMARYLLIS.
——— *St. Bruno's.* See HEMERACALLIS.
——— *Conval.* See CONVALLARIA.
——— *Guernsey.* See AMARYLLIS.
——— *Jacobrea.* See AMARYLLIS.
——— *Japan.* See AMARYLLIS.
——— *May.* See CONVALLARIA.
——— *Mexican.* See AMARYLLIS.
——— *Persian.* See FRITTILLARIA.
——— *Superb.* See GLORIOSA.
——— *Water.* See NYMPHŒA.
——— *Less Yellow Water.* See MENYANTHES.
——— *Ceylon.* See AMARYLLIS.
——— *Daffodil.* See AMARYLLIS PANCRATIUM.

LILY, *Hyacinth*. See SCILLA.
——— *Pyramidal*. See LILIUM.
——— *Thorn*. See CATESBÆA.

LILY (William), a famous grammarian, was born at Oldham, in Hampshire, about 1466, and educated at Magdalen college, Oxford, where he took his degree of B. A. and then went on pilgrimage to the holy land. During his journey he acquired the Greek language at the Isle of Rhodes. From thence he went to Rome, and on his return to England, in 1509, settled in London, where he was appointed first master in St. Paul's school. He discharged his trust with great reputation, and brought up many eminent scholars. He died of the plague, in 1522. He wrote several pieces besides his grammar, which is too well known to need observation.

LILY (George), eldest son of the above, was born at London, and educated at Magdalen college, Oxford, and became prebendary of Canterbury. He was the first who published an exact map of Britain, and died in 1559. He wrote some books on the English history.

LILYBÆUM, a promontory of Sicily, projecting towards the African coast, with a town of the same name near the Ægates. The town was strong and very considerable, and it maintained long sieges against the Carthaginians, Romans, &c. Nothing now remains of this city, but the ruins of temples and aqueducts.

LILYLI'VERED. *a.* (*lily* and *liver*.) White-livered; cowardly (*Shakspeare*).

LIMA, a city, capital of Peru, with an archbishop's see, and a university. In 1534, Pizarro, marching through the country, was struck with the beauty and fertility of the extensive valley of Rimac. There, on a small river of the same name with the valley at the distance of five miles from Callao, the most commodious harbour in the Pacific Ocean, he founded a city, and gave it the name of Ciudad de los Reyes. This name it retains among the Spaniards in all legal deeds, but is better known to foreigners by that of Lima, a corruption of the ancient appellation of the valley in which it is seated. Lima gives its name to the principal audience of Peru, and is surrounded with brick walls, with ramparts and bastions. The streets are handsome and straight: the houses are generally only one story high, on account of the earthquakes. One part of the roofs is covered with coarse linen cloth, and the others only with reeds, which is not inconvenient, because it never rains here; but the rich inhabitants cover theirs with fine mats, or beautiful cotton cloths. There are trees planted all round their houses, to keep off the heat of the sun. What the houses want in height they have in length and depth; for some of them are 200 feet long, and proportionably broad, so that they have 10 or 12 large apartments on the ground floor. The river forms canals in the streets, which run to most of the houses, and serve to water their gardens, &c. The churches and convents are extremely rich; and many images of the saints are of gold, adorned with jewels. The city is four miles in length, and two in breadth, and is divided into eight parishes. It is the seat of the viceroy, and contains several courts, as that of the viceroy, of the archbishop, of the inquisition, of the crusado, and of the wills. Earthquakes are very frequent, and some have done the city much damage, particularly that in 1746, by which it was almost destroyed. The inhabitants are so rich, that when the viceroy, sent from Spain in 1682, made his public entrance into this city, they paved the streets he was to pass through with ingots of silver. They are also very debauched, but, at the same time, extremely superstitious; and they have a strong belief in the power of charms. Lima is 800 miles S. of Quito. Lon. 76. 44. W. Lat. 12. 1. S.

LIMA, an audience of Peru, lying on the Pacific Ocean; bounded on the N. by the audience of Quito, on the E. by the Andes, on the S. by the audience of Los Charcos, and on the W. by the Pacific Ocean.

LIMATURA FERRI. Steel filings are considered as possessing stimulating and strengthening qualities, and are exhibited in worm cases, ataxia, leucorrhœa, diarrhœa, chlorosis, &c.

LIMAX. Slug; naked snail. In zoology a genus of the class vermes, order mollusca. Body oblong, creeping with a fleshy kind of shield above and a longitudinal flat dish beneath; aperture placed on the right side within the shield; feelers four, situate above the mouth, with an eye at the tip of each of the larger ones. Fifteen species; of which six are common to our own country. The following are most worthy of notice.

1. L. ater. Black slug. Body black and furrowed with deep wrinkles. There are four or five varieties from a little variation of colour; the feelers however are always black, the back convex; the shield rough with numerous dots; abdomen wrinkled. Found in woods, meadows, fields and gardens; from one and a half to five inches long; crawls slowly, and leaves a slime upon whatever it passes over.

2. L. agrestis. Rustic slug. Body whitish, with black feelers. Of this there are also several varieties, from spots or streaks or other intermixtures of colour. The variety possest of a yellowish shield, and perhaps several others, has a power of secreting a large quantity of mucus from the under surface, and forming it into a thread, like a spider's web; by this means it often suspends itself and descends from the branches of trees or any height it had crawled up to. The variety with scattered black specks is recommended to be swallowed by consumptive persons. It is found in gardens, pastures and groves, from May till Decem

ber; about half an inch long; and when touched, sticks as if dead to the fingers.

LIMB. *s.* (lim, Saxon.) 1. A member; a jointed or articulated part of animals (*Mil.*) 2. (*limbe*, French.) An edge; a border (*Newton*).

*To* LIMB. *v. a.* (from the noun.) 1. To supply with limbs (*Milton*). 2. To tear asunder; to dismember.

LIMB. In botany. The border or upper dilated part of a monopetalous corol. Since we have only the word border in vernacular English, to express the upper spreading part, both in this and the polypetalous corol, it would perhaps be better to preserve the Latin terms *limb* (*limbus*) for the first, and *lamen* (*lamina*) for the second.

Limb, the outermost border, or graduated edge, of a quadrant, astrolabe, or such like mathematical instrument.

The word is also used for the arch of the primitive circle, in any projection of the sphere in plano.

Limb also signifies the outermost border or edge of the sun or moon; as the upper limb, or edge; the lower limb; the preceding limb, or side; the following limb.—Astronomers observe the upper or lower limb of the sun or moon, to find their true height, or that of the centre, which differs from the others by the semidiameter of the disc.

LIMBAT, the name of a periodical wind common in the island of Cyprus, and of great service in moderating the heats of the climate, which would otherwise be intolerable. According to the Abbe Mariti, it begins to blow at eight in the morning the first day; increases as the sun advances till noon; then gradually weakens, and at three falls entirely. On the second day it arises at the same hour; but it does not attain its greatest strength till about one in the afternoon, and ceases at four precisely. On the third day it begins as before; but it falls an hour later. On the five succeeding days, it follows the same progression as on the third; but it is remarked, that a little before it ceases, it becomes extremely violent. At the expiration of five days it commences a new period like the former. By narrowly observing the sea on that side from which it is about to blow a little before it arises, one may determine what degree of strength it will have during the day. If the horizon is clear, and entirely free from clouds, the wind will be weak, and even almost insensible; but if it is dark and cloudy, the wind will be strong and violent. This limbat wind, notwithstanding its utility in moderating the excessive heat, often becomes the cause of fevers, especially to the Europeans, from their being less habituated to the climate, and more apt than the natives to suffer themselves to be surprised by the cool air, when in a state of perspiration. This wind, the falling of which happens an hour sooner or later, is succeeded by a calm, accompanied by a certain moisture that renders the air somewhat heavy. This moisture disappears in the evening, being dissipated by a wind which arises every day at that period. This wind is considered as a land breeze by the inhabitants of the southern and eastern parts of the island; but it is called a sea breeze by those in the northern and western, who indeed receive it immediately from the sea.

LI'MBED. *a.* (from *limb.*) Formed with regard to limbs (*Pope*).

LI'MBER. *a.* Flexible; easily bent; pliant; lithe (*Ray. Harvey*).

LI'MBERNESS. *s.* Flexibility; pliancy.

LI'MBERS, in artillery, a sort of advanced train, joined to the carriage of a cannon on a march. It is composed of two shafts, wide enough to receive a horse between them, called the fillet horse: these shafts are joined by two bars of wood, and a bolt of iron at one end, and mounted on a pair of rather small wheels. Upon the axle-tree rises a strong iron spike, which is put into a hole in the hinder part of the train of the gun-carriage, to draw it by. But when a gun is in action, the limbers are taken off, and run out behind it.—See the dimensions and figure in Müller's Treatise of Artillery, pa. 187.

LI'MBO. *s.* 1. A region bordering upon hell, in which there is neither pleasure nor pain (*Shakspeare*). 2. Any place of misery and restraint (*Hudibras*).

LIMBORCH (Philip), a learned divine, was born at Amsterdam in 1633, and received his education among the remonstrants. In 1654 he became a probationary minister at Haerlem, from whence he removed to Gouda as pastor of a remonstrant congregation. In 1667 he became minister at Amsterdam, and the year following succeeded Pontanus in the divinity professorship. In 1686 he published his System of Theology according to the tenets of the remonstrants, and it was so well received as to pass through four editions. The same year he had a dispute with Isaac Orobio, a Spanish Jew, the result of which was an admirable piece by our author, entitled, Coliocatio Amica de Veritate Religionis Christianæ cum erudito Judæo. In 1694 he succeeded in recovering a young woman to christianity, who had been perverted to Judaism by a rabbi of whom she had received some instructions in Hebrew. This learned man died in 1712. Besides the above books he published the History of the Inquisition, and several of the works of Episcopius, who was his great uncle.

LIMBURG, a town of Germany, in the electorate of Treves. The Austrians defeated the French on the heights near this place, in 1796. It is seated on the Lahn, 10 miles E. of Nassau, and 20 N. of Mentz. Lon. 7. 51. E. lat. 50. 24. N.

Limburg, a fertile province of the Netherlands; bounded on the N. by the

duchy of Juliers, on the E. by that duchy and the territory of Aix-la-Chapelle, and on the S. and W. by the bishopric of Liege, from which it is separated by the Maese. It is 42 miles long and 30 broad, and contains some of the best iron mines in the Netherlands.

Limburg, the capital of Austrian Limburg. It was taken by the French in 1675, and by the allies in 1702, but afterward ceded to the Austrians, the fortifications having been first demolished. Here is a manufacture of woollen cloths, and it is famous for excellent cheese. It is seated on a mountain, near the river Verse, 15 miles S. E. of Liege. Lon. 6. 5. E. lat. 50. 38. N.

LIME, a town in Dorsetshire. See Lyme Regis.

Lime, or Limen, a village in Kent, three miles W. of Hithe. It was formerly a port, till choked up by the sands, and is now a poor town, but it has the horn and mace, and other tokens left of its ancient grandeur. It used to be the place where the lord warden of the Cinque Ports was sworn, at his entrance upon his office. The Roman road from Canterbury, called Stane-street, ended here; and from the brow of its hill may be seen the ruins of the Roman walls. Here was formerly a castle, now converted into a farm-house.

Lime, in mineralogy and masonry, the basis of chalk, marble and mortar. See Creta and Marmor.

This substance has been known from the earliest ages; from a very early period of time it has been employed as an ingredient in mortar, as an article in medicine and as a manure to fertilize fields. It is found in calcareous spars, shells and a variety of other substances, but purest and most in quantity in lime-stones, marbles and chalk. None of these substances are, however, strictly speaking, lime; but they are all capable of becoming lime by a well known process; by keeping them some time in a white heat; which process is called burning of lime. The product which in common language is denominated *quick-lime* is the *lime* of chemistry.

Pure lime is of a white colour, moderately hard but easily reducible to a powder. It has a hot burning taste, and in some measure corrodes and destroys the texture of those animal bodies to which it is applied. Its specific gravity is 2. 3. It tinges vegetable blues green, and at last converts them to yellow. It is incapable of being fused by the most violent heats that can be produced in furnaces, or even by the most powerful burning-glasses.

If water be poured on newly-burnt lime it swells and falls to pieces, and is soon reduced to a very fine powder. In the mean time so much heat is produced that part of the water flies off in vapour. If the quantity of lime slacked (as this process is termed) be great, the heat produced is sufficient to set fire to combustibles. In this manner vessels loaded with lime have sometimes been burnt. When great quantities of lime are slacked in a dark place, not only heat but light also is emitted, as Mr. Pelletier has observed. When slacked lime is weighed it is found heavier than it was before. This additional weight is owing to a part of the water with the lime; which water may be separated again by the application of a red heat; and by this process the lime becomes just what it was before being slacked. Hence the reason of the heat cooled during the slacking of lime. Part of the water combines with the lime and thus becomes solid; of course it parts with its caloric of fluidity, and probably also with a considerable quantity of caloric which exists in water even when in the state of ice: for when two parts of lime and one part of ice (each at 32) are mixed, they combine rapidly, and their temperature is elevated to 212. The elevation of temperature during the slacking of barytes and strontian is owing to the same cause.

The smell perceived during the slacking of lime is owing to a part of that earth being elevated along with the vapour of the water, as evidently appears from this circumstance, that vegetable blues exposed to this vapour are converted into green.

Limestone and chalk, though capable of being converted into lime by burning, possess hardly any of the properties of that active substance. They are tasteless; scarcely soluble in water, and do not perceptibly act on animal bodies. It was for many years undecided, and indeed has been but lately determined what the actual difference between lime and limestone is owing to. The earliest chemical attentions that were paid to these substances discovered that the latter was specifically heavier than the former; and it was soon conceived that the greater weight was owing to a combination of water; upon pushing the examination, however, still farther, it was next perceived that the weight of water possessed by the lime-stone by no means allowed for the difference: but some very happy experiments of Dr. Black, during the general enquiry, very shortly settled the dispute by proving that a considerable quantity of air as well as of water existed in the lime-stone, which did not exist in the lime, and that the weight of the extricated air and water conjointly just accounted for the difference between the two. This air which from its confinement in the lime-stone was denominated *fixed air*, was soon after minutely examined by Dr. Priestley and several other philosophers, and found to consist of characters peculiar to itself, and that these characters corresponded to those of the gas extricated from charcoal, and combined with oxygen, whence it was denominated *carbonic acid gas*.

Water, at the common temperature of

the atmosphere, dissolves about 0.002 parts of its weight of lime. This solution is called lime-water. It is limpid, has an acrid taste, and changes vegetable blue colours to green. One ounce troy of lime-water, contains about one grain of lime.

Lime is not acted upon by light, neither does it combine with oxygen: sulphur and phosphorus are the only simple substances with which it unites. It does not combine with azot, but it unites readily with muriatic acid, and forms muriat of lime. It facilitates the oxydizement of several of the metals, and combines with several of the metallic oxyds, and forms salts which have not hitherto been examined, if we except the compounds, which it produces with the oxyds of mercury and lead, described by Berthollet. Lime-water also dissolves the red oxyd of lead, and litharge still better.

Lime does not combine with the alkalies. One of its most important uses is the formation of mortar as a cement in building. Mortar is composed of quick-lime and sand reduced to a paste with water. When dry it becomes as hard and as durable as a stone; and adheres very strongly to the surfaces of the stones it is employed to cement. But this effect is produced very imperfectly unless the mortar be well prepared: for which purpose the lime should be pure, completely free from carbonic acid, and in the state of a very fine powder; the sand should be free from clay, and partly in the state of fine sand, partly in that of gravel; the water should be pure, and if previously saturated with lime so much the better. The best proportions, according to the experiments of Dr. Higgins, are three parts of fine sand, four parts of coarser sand, one part of quick-lime recently slacked; and as little water as possible.

The stony consistence which mortar acquires, is owing partly to the absorption of carbonic acid, but principally to the combination of part of the water with the lime. This last circumstance is the reason that if to common mortar one-fourth part of lime, reduced to powder without being slacked, be added, the mortar when dry acquires much greater solidity than it otherwise would do. Higgins found that the addition of burnt bones gives additional tenacity to mortar, and renders it less apt to crack in drying; but the quantity should not exceed one-fourth of the lime employed.

When a little manganese is added to mortar it acquires the important property of hardening under water; so that it may be employed in constructing those edifices which are constantly exposed to the action of water. Lime-stone is found not unfrequently combined with manganese; and in such case it becomes brown by calcination instead of white. These native lime-stones are employed for making water-mortar; but good water-mortar may be made by the following process, first proposed by Morveau. Mix together four parts of blue clay, six parts of black oxyd of manganese and ninety parts of lime-stone, all in powder. Calcine this mixture to expel the carbonic acid, mix it with sixty parts of sand, and form it into mortar with a sufficient quantity of water.

The best mortar for resisting water is made by mixing with lime puzzolano, a volcanic sand brought from Italy. Morveau informs us that basaltes, which is very common in our own country, may be substituted for puzzolano. It must be heated in a furnace, thrown while red-hot, into water, and then passed through a sieve to reduce it to the proper size.

LIME-STONE: the harder kinds of native chalk or carbonat of lime. It is often combined with iron ochre and hence assumes a blueish, greyish, or brownish, appearance. On breaking, it exhibits a granular fracture. See LIME, CRETA, STALACTITE, and MARMOR, &c. It is only necessary to add that the chief kinds are, 1. *compact* lime-stone, including common lime-stone and roe-stone; 2. *foliated lime-stone*, whether granular or sparry; 3. *fibrous lime-stone* including calcsinter, and pea-stone: 4. *calc-tuff*, found chiefly in alluvial land; 5. *arragonite;* 6. *slate spar;* 7. *brown spar;* 8. *dolomite;* 9. *rhomb spar*; 10. *swine-stone;* 11. *marl;* 12. *bituminous marl slate.*

LIME, in botany. See CITRUS.

LIME-TREE. See TILIA.

LIME-BROOK. See VERONICA.

LIME-GRASS. See ELYMUS.

*To* LIME. *v. a.* (from the noun.) 1. To entangle; to ensnare (*Shakspeare*). 2. To smear with lime (*L'Estrange*). 3. To cement; not used (*Shakspeare*). 4. To manure ground with lime (*Child*).

LI'MEKILN. *s.* (*lime* and *kiln.*) A kiln where stones are burnt to lime (*Woodward*).

LI'MESTONE. *s.* (*lime* and *stone.*) The stone of which lime is made. See MARMOR.

LIME-WATER. *s.* A medicine made by pouring water upon quicklime. See PHARMACY.

LIMERICK, a county of Ireland, in the province of Munster, 48 miles long and 23 broad; bounded on the N. by Tipperary and Clare, from which last it is separated by the Shannon; on the W. by Kerry; on the S. by Cork, and on the E. by Tipperary. It contains 130 parishes, and sends eight members to parliament. It is a fertile country, and well inhabited, though the W. parts are mountainous.

LIMERICK, or LOUGH MEATH, a city of Ireland, in the county of Limerick, and the metropolis of the province of Munster. Within a century, it was reckoned the second city in the kingdom; at present it has lost its rank; not because it flourishes less, but because Cork flourishes more. It is still a commercial and populous place; and consists of the Irish and English town; the latter situate on an island formed by the

Shannon, and called King's Island. Limerick is three miles in circumference, and has a market on Wednesday and Saturday. The linen, woollen, and paper manufactures are carried on here to a great extent; and the export of provisions is considerable. Beside the cathedral and other churches, here are many hospitals, and some handsome public structures. Ardfert and Aghadoe, in the county of Kerry, are united to the see of Limerick. King William was obliged to raise the siege of this city in 1690; but, in 1691, the garrison surrendered on a very honourable capitulation. It is 40 miles S. of Galway, and 94 S. W. of Dublin. Lon. 8. 34. W. lat. 52. 42. N.

LI'MEUM. In botany, a genus of the class heptandria, order digynia. Calyx five-leaved; petals five, equal; capsule globular, two-celled. Three species, herbaceous Cape plants.

LI'MIT. *s.* (*limite*, French.) Bound; border; utmost reach (*Exodus*).

*To* LI'MIT. *v. a.* (*limiter*, French.) 1. To confine within certain bounds; to restrain; to circumscribe (*Swift*). 2. To restrain from a lax or general signification: as, the universe is here *limited* to this earth.

LIMIT, is a term used by mathematicians, for some determinate quantity, to which a variable one continually approaches, and may come nearer to it than by any given difference, but can never go beyond it; in which sense a circle may be said to be the limit of all its inscribed and circumscribed polygons: because these, by increasing the number of their sides, can be made to be nearer equal to the circle than by any space that can be proposed, how small soever it may be.

In Algebra, the term limit is applied to two quantities, of which the one is greater and the other less than some middle quantity, as the root of an equation, &c. And in this sense it is used when speaking of the limits of equations, a method by which their solution is greatly facilitated.

Let any equation, as $x^3-px^2+qx-r=o$ be proposed; and transform it into the following equation:

$$\left.\begin{array}{r} y^3+3ey^2+3e^2y+e^3 \\ -py^2-2pey-pe^2 \\ +qy+qe \\ -r \end{array}\right\}=o.$$

Where the values of $y$ are less than the respective values of $x$, by the difference $e$. If you suppose $e$ to be taken such as to make all the coefficients of the equation of $y$ positive, viz. $e^3-pe^2+qe-r$, $3e^2-2pe+q$, $3e-p$; then there being no variation of the signs in the equation, all the values of $y$ must be negative; and consequently the quantity $e$, by which the values of $x$ are diminished, must be greater than the greatest positive value of $x$; and, consequently, must be the limit of the roots of the equation $x^3-px^2+qx-r=o$.

It is sufficient, therefore, in order to find the limit, to inquire what quantity substituted for $x$, in each of these expressions $x^3-px^2+qx-r$, $3x^2-2px+q$, $3x-p$, will give them all positive; for the quantity will be the limit required.

Having found the limit that surpasses the greatest positive root, call it $m$. And if you assume $y=m-x$, and for $x$ substitute $m-y$, the equation that will arise will have all its roots positive; because $m$ is supposed to surpass all the values of $x$, and consequently $m-x\,(=y)$ must always be affirmative. And, by this means, any equation may be changed into one that shall have all its roots affirmative.

Or, if $-n$ represent the limit of the negative roots, then by assuming $y=x+n$ the proposed equation shall be transformed into one that shall have all its roots affirmative; for $+n$ being greater than any negative value of $x$, it follows that $y=x+n$ must be always positive.

What is here said of the above cubic equation, may be easily applied to others; and of all such equations, two limits are easily discovered, viz. $o$, which is less than the least; and $e$, found as above, which surpasses the greatest root of the equation. But besides these, other limits still nearer the roots may be found.

We may farther remark,

1. That, the greatest negative coefficient of an equation increased by unity, is greater than the greatest root of an equation.

2. In any equation $x^n-px^{n-1}+qx^{n-2}-rx^{n-3}+sx^{n-4}-\&c.=o$, whose roots are possible and positive, $\sqrt{\dfrac{p^2-2q}{n}}$ is less than the greatest root.

3. The roots of the equation $nx^{n-1}-(n-1)px^{n-2}+(n-2)qx^{n-3}-\&c.=o$, are limits between the roots of the equation $x^n-px^{n-1}+qx^{n-2}-\&c.=o$; when the roots of the latter equation are possible.

4. If all the roots of an equation be positive, or all negative, and its terms be multiplied by the terms of any arithmetical progression, the resulting equation will be a limiting equation to the former.

See farther Maclaurin's Algebra, and Wood's Algebra, pa. 146—159.

LIMIT *of Distinct Vision*, in Optics. See DISTINCT VISION.

LIMIT *of a Planet*, has been sometimes used for its greatest heliocentric latitude.

LIMITED *Problem*, denotes a problem that has but one solution, or some determinate number of solutions: as to describe a circle through three given points that do not lie in a right line, which is limited to one solution only; to divide a parallelogram into two equal parts by a line parallel to one


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side, which admits of two solutions, according as the line is parallel to the length or breadth of the parallelogram; or to divide a triangle in any ratio by a line parallel to one side, which is limited to three solutions, as the line may be parallel to any of the three sides.

LI'MITARY. *a.* (from *limit.*) Placed at the boundaries as a guard or superintendant (*Milton*).

LIMITA'TION. *s.* (*limitation*, French.) 1. Restriction; circumscription (*Hooker*). 2. Confinement from a lax or undeterminate import (*Hooker*).

LIMMA, or REMNANT. An interval used in the ancient Greek music, which is less by a comma than a major-semitone; and which, when taken from a major tone, leaves the apotome for a remainder.

LIMMAT, a river of Swisserland, which rises in the Alps, about eleven miles S. Glarus, where it first takes the name of Lint, or Linth, passes Glarus, and near the Lake of Wallenstadt, joins the Mat, when it changes its name to Limmat, passes through the Lake of Zurich and joins the Aar, three miles N. Baden.

LI'MNING, the art of painting in water-colours.

In which sense limning stands contradistinguished from painting, properly so called, which is done in oil-colours.

Limning is much more the ancient kind of painting. Till a flemish painter, one John Van Eyck, better known by the name of John of Bruges, found out the art of painting in oil, the painters all painted in water, and in fresco, both on their walls, or wooden boards, and elsewhere. When they made use of boards, they usually glued a fine linen cloth over them, to prevent their opening; then laid on a ground of white; and, lastly, they mixed up their colours with water and size, or with water and yolks of eggs, well beaten with the branches of a fig-tree, the juice whereof thus mixed with the eggs; and with this mixture they painted their pieces.

In limning, all the usual colours are proper enough, excepting the white made of lime, which is only used in fresco. But the azure and ultramarine must always be mixed up with size, or with gum, because the yolks of eggs give yellow colours a greenish tincture. But there are always applied two lays of hot size, before the colours mixed even with size are laid on; the composition made with eggs, and the juice of the fig-tree, being only used by touching up and finishing, and to prevent the necessity of having a fire always at hand to keep the size hot; yet it is certain, that the size-colours hold the best, and are accordingly always used in cartoons, &c. This size is made of shreds of thin leather, or of parchment.

*To* LIMN. *v. n.* (*enluminer*, French.) To draw; to paint any thing, in water colours (*Peacham*).

LI'MNER. *s.* (corrupted from *enluminer*, Fr.) A painter; a picture-maker (*Glan.*)

LIMODORUM. In botany, a genus of the class gynandria, order diandria. Nectary one-leaved, concave, pedecelled, within the lowest petal. Ten species, natives of Asia or America, all tuberous-rooted plants, bearing flowers in spikes or racemes; some panicled, and some bearded.

LIMOGES, a town of France, and capital of the department of the Upper Vienne. Before the revolution, the see of a bishop. This town was taken from the Visigoths by the French, under Clovis; after whose death it came to the dukes of Aquitaine, and in dowry with Eleonora to Henry II. king of England, and fell, with the rest of the country, to the kings of France. It is a town of considerable trade, and contains about 13,000 inhabitants: twenty-seven posts N. E. Bourdeaux, and forty-six and three quarters S. S. W. Paris. Lon. 1. 20. E. Lat. 45. 50. N.

LIMON, (*Limonum*, *i*, n. and *limon*, *ōnis*, m. Heb.) *Citrea malus. Citrus.* The lemon. The tree which affords this fruit is the *Citrus medica; petiolis linearibus* of Linnéus. A native of the upper parts of Asia, but cultivated in Spain, Portugal, and France. The juice, which is much more acid than that of the orange, possesses similar virtues. It is always preferred where a strong vegetable acid is required. Saturated with the fixed vegetable alkali, it forms the *kali citratrum*, which is in frequent extemporaneous use in febrile diseases, and by promoting the secretions, especially that of the skin, proves of considerable service in abating the violence of pyrexia. As an antiscorbutic, the citric acid is also very generally taken on board ships destined for long voyages; but even when well depurated of its mucilaginous parts, it is found to spoil by long keeping. To preserve it in purity for a considerable length of time, it is necessary that it should be brought to a highly concentrated state, and for this purpose it has been recommended to expose the juice to a degree of cold sufficient to congeal the aqueous and mucilaginous parts. After a crust of ice is formed, the juice is poured into another vessel; and, by repeating this process several times, the remaining juice, it is said, has been concentrated to eight times its original strength, and kept without suffering any material change for several years. The oxalic acid or acid of sorrel, however, sold, of late in a crystallized state, under the name of crystallized lemon juice, is by far the most convenient form of supplying ships with an antiscorbutic material of this kind.

The exterior rind of the lemon is a very grateful aromatic bitter, not so hot as orange peal, yielding in distillation a less quantity of oil, which is extremely light, almost colourless, and generally brough from the southern parts of Europe, unde

the name of Essence of Lemons. The lemon-peel, though less warm, is similar in its qualities to that of the orange, and is employed with the same intentions. The pharmacopoeias direct a syrup of the juice, and the peel enters into vinous and aqueous bitter infusions; is also ordered to be candied; and the essential oil is an ingredient in the *spiritus ammoniæ compositus* and other formulæ. See CITRUS.

LIMONIA. In botany, a genus of the class decandria, order monogynia. Calyx five-parted; petals five; stigma capitate; berry eight celled; seeds solitary. Eight species; shrubs or trees of India.

LIMOSELLA. Mud-wort. In botany, a genus of the class didynamia, order angiospermia. Calyx five-cleft; corol five-cleft, nearly equal; stamens approaching each other in pairs; capsule ovate, one celled, two-valved, many-seeded. Two species, as follow:

1. L. Aquatica. Lance-spatulate leaves; scapes shorter than the leaves. Found in the muddy ditches of our own country.

2. L. diandra. Leaves linear, spatulate; scapes as long as the leaves; flowers diandrous. A native of the Cape.

LIMOSIN, before the French revolution, a province of France, of which Limoges was the capital.

LI'MOUS. *a.* (*limosus*, Latin.) Muddy; slimy (*Brown*).

LIMP. *a.* (*limpio*, Italian.) Vapid; weak.

*To* LIMP. *v. n.* (lımpen, Saxon.) To halt; to walk lamely (*Prior*).

LIMPET, in helminthology. See PATELLA.

LI'MPID. *a.* (*limpidus*, Latin.) Clear; pure; transparent (*Woodward*).

LI'MPIDNESS. *s.* Clearness; purity.

LI'MPINGLY. *ad.* (from *limp.*) In a lame halting manner.

LI'MY. *a.* (from *lime.*) 1. Viscous; glutinous (*Spenser*). 2. Containing lime (*Grew*).

*To* LIN. *v. n.* (ablınnan, Saxon.) To yield; to give over (*Spenser*).

LINACRE (Thomas), an English physician, was born at Canterbury about 1460, and educated at the king's-school there, from whence he was sent to All Soul's college, Oxford, of which he became fellow. After completing his academical studies he travelled to Italy, where he gained a knowlege of the Greek language. On his return he took his doctor's degree, and was made professor of physic at Oxford. Henry VII. called him from the university, and appointed him preceptor and physician to prince Arthur. He afterwards became physician to the king, and also to his successor Henry VIII. In 1509 he entered into orders, and obtained the precentorship of York, which he resigned, and was made prebend of Westminster. He died in 1524, and was buried in St. Paul's cathedral. He projected the foundation of the college of physicians, and was himself the first president. He published, 1. A Latin Translation of Proclus's Sphere; Venet. 1499; 2. The Rudiments of Grammar for the Use of the Princess Mary; 3. De Emendata Structura Latini Sermonis; 4. Translations of several of Galen's pieces.

LINARIA, (*Linaria, æ,* f. from *linum*, flax, named from the resemblance of its leaves to those of flax). *Osyris. Urinaria.* Common toad flax. *Antirrhinum linania* of Linnéus. *A foliis lanceolato linearibus confertis caule erecto, spicis terminalibus sessilibus, floribus imbricatis.* A perennial indigenous plant, common in barren pastures, hedges, and the sides of roads, flowering from July to September. The leaves have a bitterish and somewhat saline taste, and when rubbed between the fingers have a faint smell resembling that of elder.

They are said to be diuretic and cathartic, and in both characters to act powerfully, especially in the first, hence the name *urinalis.* They have been recommended in dropsies and other disorders requiring powerful evacuations. The linaria has also been used as a resolvent in jaundice, and such diseases as were supposed to arise from visceral obstructions. But the plant has been chiefly valued for its effects when externally applied, especially in hæmorrhoidal affections, for which both the leaves and flowers have been employed in various forms of ointment, fomentation, and poultice. Dr. Wolph first invented an ointment of this plant for the piles. The Landgrave of Hesse, to whom he was physician, constantly interrogated him to discover its composition, but Wolph obstinately refused, till the prince promised to give him a fat ox annually for the discovery: hence to the following verse which was made to distinguish the linaria from the escula, viz.

"*Esula lactescit, sine lacte linaria crescit,*"
The hereditary marshal of Hesse added,
"*Esula nil nobis, sed dat linaria taurum.*"

See ANTIRRHINUM.

LINARIA, in ornithology. See FRINGILLA.

LINCHPIN. *s.* An iron pin that serves to keep a wheel upon the axle-tree, while it allows it to turn.

LINCOLN, a city of England, and capital of Lincolnshire, situated on the river Witham: it is a very ancient city, and was formerly surrounded with walls, and defended with towers, and was one of the chief towns for buying and selling wool. We are told, that in Edward the Confessor's time, Lincoln contained 1070 houses, and 900 burgesses. William the Conqueror built a castle to keep the citizens in awe. Lincoln formerly contained fifty-two parish churches, with many religious houses, but in the second year of Edward VI. the number of churches was reduced to fifteen. Lincoln was erected into a bishopric, in the year 1088, this see being removed from Dorchester. The length of the cathedral from east to west (including the walls) is 530 feet,

The length of the great transept from north to south is 227. From the pavement to the top of the lantern in the rood tower, is 124 feet. See CATHEDRAL. Before the reformation took place, this cathedral was undoubtedly the finest and richest in the whole kingdom, and the number of splendour of its tombs almost incredible. In the reign of king Henry the eighth, in the year 1540, by the king's orders, there were carried from this church into his coffers, no less than 2621 ounces of pure gold, and 4285 ounces of silver; besides an amazing quantity of diamonds, pearls, sapphires, rubies, turquoises, carbuncles, and two shrines, one of pure gold, called St. Hugh's, the other of silver, called Bishop St. John of D'Alderby. A second plunder was committed on this church, in the year 1548, during the presidence of bishop Hobech, who being a zealous reformist, gave up all the remaining treasure, which Henry had thought proper to leave behind. Lincoln, at this day, is a long, straggling town, chiefly consisting of one street. There are, however, several good buildings in it, both below and above the hill. It has a plentiful weekly market on Friday, well supplied with provisions of all kinds, and its corn and wool trade is very great: large quantities of which are exported into Yorkshire, the vessels bringing coals back. Upon the plain, on the north side of Lincoln, was fought the famous battle between the friends of the empress Maud and king Stephen, in which that prince was defeated and taken prisoner. Upon Lincoln heath were likewise fought several bloody battles, between the forces of Cromwell, and the royal army. Lincoln is so full of the ruins of monasteries and religious houses, that the very barns, stables, outhouses, and even some of the hogsties, are built with arched windows and doors. The ruins of the castle, are venerable pieces of antiquity; and from its bold and noble situation upon a high hill, it must have been a place of prodigious strength. The county-gaol is now situated in the castle-yard. In 1800 the number of houses in this city was 1574, and of inhabitants 7398: the number of electors about 1100. Distance from London 133 miles. Long. 0. 25. W. Lat. 53. 15. N.

LINCOLNSHIRE, a maritime county of England, 77 miles in length and 48 in breadth, is bounded on the east by the German ocean, on the west by Nottinghamshire, on the north by Yorkshire, on the south by Rutlandshire, Northamptonshire, and Cambridgeshire. It contains 631 parishes, and 31 market towns, whereof five send members to parliament, which, with two for the county, make twelve in all. The principal rivers are the Humber, the Trent, the Witham, the Nenn, the Welland, the Ankham, and the Dun. It divided into three parts, Lindsay, Kesteven, and Holland; the air of which last is unwholesome and foggy, on account of the fens and large marshes. The soil of the north and west parts is very fertile, and abounds in corn and pastures. The east and south parts are not so proper for corn: but then they supply them with fish and fowl in great plenty, particularly ducks and geese. Lincoln is the principal town. This county contains about 1,440,000 acres of land: its inhabitants amount to 208,557, of whom about 42,000 are capable of bearing arms. The recent improvements in inland navigation, give this county communication with the rivers Mersey, Dee, Ribble, Ouse, Darwent, Severn, Thames, Avon, &c.

LI'NCTUS, (*Linctus*, *us*, m. from *lingo*, to lick.) A term in pharmacy that is generally applied to a soft and somewhat oily substance, of the consistence of honey.

LINDAU, a free imperial town of Suabia. Here is a celebrated abbey of canonesses, whose abbess is a princess of the empire, and a Roman-catholic, though the inhabitants of the town are Protestants. The French took possession of this town in July 1796. It is a trading place, seated on an island of the lake of Constance, joined to the main land by a long beautiful bridge, 12 miles S.E. of Buchorn, and 75 S. by W. of Augsburg. Long. 9. 50. E. Lat. 47. 38. N.

LINDAU, a town of Upper Saxony, in the principality of Anhalt Zerbst, five miles N. of Zerbst.

LINCO'MIA. In botany a genus of the class pentandria, order digynia. Petals five with a nectareous excavation at the base; capsule half inferior, two-celled. A Cape shrub, with lateral sessile flowers.

LINDEN TREE. See TILIA.

LI'NDERA. In botany a genus of the class hexandria, order monogynia. Calyxless; corol six-petalled, inferior; stigmas two; capsule two-celled. One species: a branched shrub of Japan, with terminal panicle.

LINDE'RNIA. In botany a genus of the class didynamia, order angiospermia. Calyx five parted, corol ringent, with the upper lip very short; two lower stamens with a terminal tooth and somewhat lateral anther; capsule one celled. Three species: two, natives of America and the West Indies; one of Japan: one of the former common to Europe.

LINDISFARNE. See HOLY *Island*.

LINDKOPING or LINKIOPING, a town of Sweden, capital of West Gothland, with a bishop's see. It is seated on the lake Wenner, 12 miles N.W. of Skar, and 178 S.W. of Stockholm. Long. 13. 5. E. Lat. 58. 25. N.

LINDOW, a town of Upper Saxony, in the Middle Marche of Brandenburg, eight miles S.S.W. of Frankfort on the Oder.

LINDSAY (John), a learned nonjuring divine, who was educated at St. Mary hall, Oxford. He officiated many years to a congregation of his own sentiments in Aldersgate-street, and was corrector of the press to Mr. Bowyer the printer. He died in 1768, aged 82. Mr. Lindsay published a translation of

Mason's Vindication of the Church of England, folio, 1726; also the Short History of the Royal succession; and Remarks on Whiston's Scripture Politics.

LINDSAY (Sir David), a celebrated Scots poet, was descended of an ancient family, and born in the reign of king James IV. at his father's seat called the Mount, near Cupar in Fifeshire. He was educated at the university of St. Andrew's; and, after making the tour of Europe, returned to Scotland in the year 1514. Soon after his arrival, he was appointed gentleman of the bed-chamber to the king, and tutor to the young prince, afterwards James V. From the verses prefixed to his dream, we learn that he enjoyed several other honourable employments at court: but, in 1533, he was deprived of all his places except that of *Lion king at arms*, which he held to the time of his death. His disgrace was most probably owing to his invectives against the clergy, which are frequent in all his writings. After the decease of king James V. Sir David became a favourite of the earl of Arran, regent of Scotland; but the abbot of Paisley did not suffer him to continue long in favour with the earl. He then retired to his paternal estate, and spent the remainder of his days in rural tranquillity. He died in 1553. His poetical talents, considering the age in which he wrote, were not contemptible; but he treats the Romish clergy with great severity, and writes with some humour: but, whatever merit might be formerly attributed to him, he takes such licentious liberties with words, stretching, or carving them for measure or rhyme, that the Scots have a proverb, when they hear an unusual expression, that, *There is nae sic a word in a' Davie Lindsay.* Mackenzie tells us, that his comedies were so facetious, that they afforded abundance of mirth. Some fragments of these comedies are still preserved in manuscript. He is said to have written several tragedies, and to have first introduced dramatic poetry into Scotland. One of his comedies was performed in 1515. Mackenzie says, he understood nothing of the rules of the theatre. He was cotemporary with John Heywood, the first English dramatic poet. His poems are printed in one small volume; and fragments of his plays, in manuscript, are in Mr. William Carmichael's collection.

LINDSÆ'A. In botany a genus of the class cryptogamia, order filices. Fructification in a continued line, a little removed from the margin; involucre from the surface, continued opening towards the margin. Thirteen species—all exotics.

LINDSEY, the largest of the three principal divisions of Lincolnshire, including all the country that lies N. of Lincoln, and the Fossdike, which Henry I. cut between the Witham and the Trent. It is the most elevated part of the county: and the air is generally esteemed healthy, especially on the W. side. To the N.E. is a large tract of healthy land, called the Wolds, the S. part of which is well inhabited, but the N. is thin of people: great flocks of sheep are bred throughout this tract. See Axholm.

LINDUS, in ancient geography, a city at the south-east part of Rhodes, built by Cercaphus, son of Sol and Cydippe. It gave birth to Cleobulus, one of the seven wise men, and to Chares and Laches, who were employed in making and finishing the famous Colossus of Rhodes.

LINE. *s.* (*linea*, Latin.) 1. Longitudinal extension (*Bentley*). 2. A slender string (*Moxon*). 3. A thread extended to direct any operations (*Dryden*). 4. The string that sustains the angler's hook (*Waller*). 5. Lineaments, or marks in the hand or face (*Cleaveland*). 6. Delineation; sketch (*Temp.*) 7. Contour; outline (*Pope*). 8. As much as is written from one margin to another; a verse (*Garth*). 9. Rank of soldiers (*Addison*). 10. Work thrown up; trench (*Dryden*). 11. Method; disposition (*Shakspeare*). 12. Extension; limit (*Milton*). 13. Equator; equinoctial circle (*Creech*). 14. Progeny; family, ascending or descending (*Shaks.*) 15. A *line* is one tenth of an inch (*Loc.*) 16. (In the plural.) A letter: as, I read your lines.

Some of these acceptations of the words it will be proper to enlarge upon; as below.

Line, in Geometry, a quantity extended in length only, without either breadth or thickness.

Lines are either right or curved. A right or straight line, is the nearest distance between two points which are its extremes or ends; or it is a line which has in every part of it the same direction or position. But a curve line has in every part of it a different direction, and is not the shortest distance between its extremes or ends.

*Right Lines* are all of the same species; but curves are of an infinite number of different sorts. As many may be conceived as there are different compound motions, or as many as there may be different relations between their ordinates and abscisses. See Curves.

Again, *Curve Lines* are usually divided into geometrical and mechanical.

*Geometrical Lines*, are those which may be found exactly in all their parts.

*Mechanical Lines* are such as are not determined exactly in all their parts, but only nearly, or tentatively. But

Des Cartes, and his followers, define geometrical Lines to be those which may be expressed by an algebraical equation of a determinate or finite degree; called its locus. And mechanical lines, such as cannot be expressed by such an equation.

But others distinguish the same lines by the names algebraical and transcendental.

Lines are also divided into orders, by Newton, according to the number of intersections which may be made by them and a right line, viz. the 1st, 2d, 3d, 4th, &c. order, ac-

cording as they may be cut by a right line, in 1, or 2, or 3, or 4, &c. points. In this way of considering them, the right line only is of the 1st order, being but one in number; the 2d order contains 4 curves only, being such as may be cut from a cone by a plane, viz. the circle, the ellipse, the hyperbola, and the parabola; the lines of the 3d order have been enumerated by Newton, in a particular treatise, who makes their number amount to 72; but Mr. Sterling found 4 others, and Mr. Stone 2 more; though it is disputed by some whether these 2 last ought to be accounted different from some of Newton's, or not. See Newton's Enumer. Lin. Tertii Ordin. also Stirling's Lineæ Tert. Ordin. Newtonianæ Oxon. 1717, 8vo. and Philos. Trans. number 456, &c. Again,

*Algebraical Lines* are divided into different orders according to the power or degree of their equations. So, the simple equation $a + by + cx = 0$ or equation of the 1st degree, denotes the 1st order or right line; the equation $a + by + cx + dyy + exy + fxx = 0$, of the 2d degree, denotes the lines of the 2d order; and the equation
$a+by+cx+dyy+exy+fxx+gy^3+hxy^2+ix^2y+kx^3=0$ of the 3d degree, expresses the lines of the 3d order; and so on. See Cramer's Introd. à l'Analyse des Lignes Courbes.

Lines, considered as to their positions, are either *parallel*, *perpendicular*, or *oblique*. And the construction and properties of each of these, see under their respective terms.

Line also denotes a French measure of length, being the 12th part of an inch, or the 144th part of a foot.

In *Astronomy*,

Line *of the Apses*, or *Apsides*, the Line joining the two apses, or the longer axis of the orbit of a planet.

*Fiducial Line*, the index line or edge of the ruler, which passes through the middle of an astrolabe, or other instrument, on which the sights are fitted, and marking the divisions.

*Horizontal Line*, a line parallel to the horizon.

Line *of the Nodes*, that which joins the nodes of the orbit of a planet, being the common section of the plane of the orbit with the plane of the ecliptic.

In *Dialling*,

*Horizontal Line*, is the common section of the horizon and the dial-plate.

*Horary*, or *Hour Lines*, are the common intersections of the hour-circles of the sphere with the plane of the dial.

*Equinoctial Line* is the common intersection of the equinoctial and the plane of the dial.

In *Fortification*, *Line* is sometimes used for a ditch, bordered with its parapet: and sometimes for a row of gabions, or sacks of earth, extended lengthwise on the ground, to serve as a shelter against the enemy's fire.

When the trenches were carried on within 30 paces of the glacis, they drew two lines, one on the right, and the other on the left, for a place of arms.

Lines are commonly made to shut up an avenue or entrance to some place; the sides of the entrance being covered by rivers, woods, mountains, morasses, or other obstructions, not easy to be passed over by an army. When they are constructed in an open country, they are carried round the place to be defended, and resemble the lines surrounding a camp, called lines of circumvallation. Lines are also thrown up to stop the progress of an army; but the term is most used for the line which covers a pass that can only be attacked in front.

When lines are made to cover a camp, or a large tract of land, where a considerable body of troops are posted, the work is not made in one straight, or uniformly bending line; but, at certain distances, the lines project in saliant angles, called redents, redans, or flankers, towards the enemy. The distance between these angles is commonly between the limits of 200 and 260 yards; the ordinary flight of a musket ball, point blank, being commonly within those limits; though muskets a little elevated will do effectual service at the distance of 360 yards.

*Fundamental Line* is the first line drawn for the plan of a place, and which shews its area.

*Central Line*, is the line drawn from the angle of the centre to the angle of the bastion.

*Line of Defence*, &c. See Defence, &c.

*Line of Approach*, or *Attack*, signifies the work which the besiegers carry on under cover, to gain the moat, and the body of the place.

*Line of Circumvallation*, is a line or trench cut by the besiegers, within cannon-shot of the place, which ranges round the camp, and secures its quarters against any relief to be brought to the besieged.

*Line of Contravallation*, is a ditch bordered with a parapet, serving to cover the besiegers on the side next the place, and to stop the sallies of the garrison.

*Lines of Communication* are those which run from one work to another.

*Line of the Base*, is that which joins the points of the two nearest bastions.

To *Line* a work, signifies to face it, as with brick or stone; for example, to strengthen a rampart with a firm wall, or to encompass a parapet or moat with good turf, &c.

Line, in Geography and Navigation, is emphatically used for the Equator or Equinoctial line.

The seamen use to baptize their fresh men, and passengers, the first time they cross the line: that is, to dip them in the sea, suspended by a rope from the yardarm, unless they compound for it, by giving something to drink.

In *Perspective*,

The *Geometrical* LINE, is a right line drawn in any manner on the geometrical plane.

*Terrestrial*, or *Fundamental Line*, is the common intersection of the geometrical plane and plane of the picture.

*Line of the Front*, is any line parallel to the terrestrial line.

*Vertical Line*, is the section of the vertical and draft planes.

*Visual Line*, is the line or ray conceived to pass from the object to the eye.

*Objective Line*, is any line drawn on the geometrical plane, whose representation is sought for in the draught or picture.

LINE *of Measures*, of any circle, in projections of the sphere, is the common interjection of the plane of projection and another plane that passes through the eye, and is perpendicular both to the plane of projection, and to the plane of that circle.

This is Mr. Emerson's definition. The late Bishop Horsley, however, objects to the the term *line of measures* as ill chosen in this sense, and prefers the term *separant*. See Horsley's Elementary Treatises, page 356, 357.

LINE *of Direction*. See DIRECTION.

LINE of gravitation of any heavy body, a line drawn through its centre of gravity, and according to which it tends downwards.

LINE of the swiftest descent of a heavy body, is the cycloid. See CYCLOID.

LINES on the plain scale, are the line of chords, line of sines, line of tangents, line of secants, line of semitangents, line of leagues; the construction and application of which see under the words SCALE, SAILING, INSTRUMENTS, &c.

LINE *of battle*, is understood of the disposition of a fleet on the day of engagement, on which occasion the vessels are usually drawn up as much as possible in a straight line, as well to gain and keep the advantage of the wind, as to run the same board.

LINE, *ship of the*, a vessel large enough to be drawn up in the line, and to have a place in a sea-fight. See SHIP.

LINE, in genealogy, a series or succession of relations in various degrees, all descending from the same common father. Direct line, is that which goes from father to son; being the order of ascendants and descendants. Collateral line is the order of those who descend from some common father related to the former, but out of the line of ascendants and descendants: in this are placed uncles, aunts, cousins, nephews, &c.

LINE was also formerly a French measure, containing the twelfth part of an inch, or the hundred and forty-fourth part of a foot. Geometricians conceive the line, notwithstanding its smallness, to be subdivided into six points.

LINES, in music, the name of those strokes drawn horizontally on a piece of paper, on and between which the characters and notes of music are disposed: their number is commonly five; when another is added, for one, two, or more notes, it is called a leger-line.

LINES, in heraldry, the figures used in armories, to divide the shield into different parts, and to compose different figures. These lines, according to their different forms and names, give denomination to the pieces or figures which they form, except the straight or plain lines.

LINE, *Fishing*. The string that suspends the angler's bait generally made of hair. To make lines after the best manner, let the hair be round, and twisted even, and as near of an equal size as possible: lay them in water for a quarter of an hour, by which means you will find which of the hairs shrinks, and then twist them again.

When you have prepared as many links as will make your line long enough, tie them together in a water knot, Dutch knot, or weaver's knot. Cut off the short ends about the breadth of a straw from the knot, and the line will be even and fit for fishing. You may make the upper part of your line, and indeed all of it, except two yards next the hook, of a coarser hair. Always let the top of your line, whether in muddy or clear waters, be made of white hair, because the motion of the line, when the fish bites will be far more discernible. Never strain your hairs before they are made into a line, for then they will shrink when used.

Never arm, fix, or whip hooks to any line, either for ground or fly angling, that consists of more than three or four links, at the most; the top of the uppermost link having a small loop, or water-noose, you may fix it to any line, and as easily remove it; there being another water-noose at the bottom of the line.

In angling for trouts, graylings, and salmon smelts, with the dub-fly; let the two first links next the hook be but of one hair each: but the hair must be strong, and of the thick ends only, and chosen for the purpose. The next two links of two hairs, and then one of three hairs; at the top of which have a water-noose, or loop to put your line to; which lowermost link should consist of three hairs, and have another water-noose at bottom, or hook-link to fix your fly to. Then let two of the next links of your line be of four hairs, and so proceed, by increasing one or two hairs till you come to six or seven at the top.

The artificial fly line should be very strong at the top; by which means a young angler may cast a fly well, and quickly become an accurate artist; and if he chance to fasten his hook, and cannot loosen it, he will not loose above one or two links at most. Angle with stronger lines at the cast fly than at

ground, in a clear water, for the trout. For in the latter case never use a line made otherwise than with a single hair at hook, and so on as above directed, but never exceeding four hairs in any one link. At the bottom of every line have a small water-noose, or loop, that you may hang on it a hook of any size, whipt to a line consisting of two or three hooks.

In muddy water, or discoloured by rain, the running-line should be half the length of the rod, and the two lowest links of three hairs each. Next should be a link of four hairs, with a loop or water-noose to fasten it to another of the same number, having likewise a water-noose at its bottom. Then proceed with links of five or six hairs each to the end. The three lowermost links or gildards, should be of a sorrel brown, or chesnut colour. The cane or reed-rod should have a top neither too stiff, nor too slender; the rod about three yards and a half long, and the top about one yard and a half, or two yards of hazle, either in one or two pieces, or five or six inches of whalebone, made round, smooth, and taper. All which will make the rod about five yards, or five yards and a half long.

The line should have more lead in a great rough river, than in one smaller and more quiet; just as much as will sink the bait to the bottom, and permit its motion, without any violent gogging on the ground. Carry the top of your rod even with your hand, beginning at the head of the stream, and letting the bait run downwards as far as the rod and line will permit, just touching on the ground: whence no more of the line must be in the water than will allow the lead to touch the bottom: for the line is to be kept as straight as possible, yet so as not to raise the lead from its position. When you have a bite, you well perceive it by your hand, and by the point of your rod and line; strike gently and straight upwards; first allowing the fish, by a little slackening the line, to take in the bait. In a clear water, indeed, it has been found best to strike at the first biting of the fish, when you angle for trout, grayling, or salmon smelt. See Angling.

*To* Line. *v. a.* 1. To cover on the inside (*Boyle*). 2. To put any thing in the inside (*Carew*). 3. To guard within (*Clarendon*). 4. To strengthen by inner works (*Shaksp.*) 5. To cover with something soft (*Shaksp.*) 6. To double; to strengthen (*Shakspeare*). 7. To impregnate: applied to animals generating (*Creech*).

LI'NEA alba. An aponeurosis that extends from the scrobiculus cordis straight down to the navel, and from thence to the pubis. It is formed by the tendinous fibres of the internal oblique ascending and the external oblique descending muscles, and the transversalis, interlaced with those of the opposite side.

LI'NEAGE. *s.* (*linage*, French.) Race; progeny; family, ascending or descending (*Atterbury*).

LI'NEAL. *a.* (*linealis*, Latin.) 1. Composed of lines; delineated (*Wotton*). 2. Descending in a direct genealogy (*Locke*). 3. Hereditary; derived from ancestors (*Shakspeare*). 4. Allied by direct descent (*Dryden*).

LI'NEALLY. *ad.* (from *lineal.*) In a direct line (*Clarendon*).

LI'NEAMENT. *s.* (*lineament*, French.) Feature; discriminating mark in the form (*Shakspeare*).

LI'NEAR. *a.* (*linearis*, Latin.) Composed of lines; having the form of lines (*Woodw.*)

Li'near *numbers*, in mathematics, such as have relation to length only; such is a number which represents one side of a plain figure. If the plain figure be a square, the linear figure is called a root.

Li'near *Problem;* that which may be solved geometrically by the intersection of two right lines. This is called a simple problem, and is capable but of one solution.

Li'near. In botany applied to the leaf. *Æquali ubique latitudine, interdum utraque extremitate tantum angustatur.* Of the same breadth throughout, except sometimes at one or both ends. As in grasses, Rosemary, &c.—Applied also to the *petiole, involucre, perianth, petals, spike*, &c.

Li'near-*wedged-shaped.* (*Lineari-cuneiforme.*) In botany, between both forms, but inclining more to the latter.

Li'near-*lanceolate.* (*Lineari-lanceolatum.*) Partaking of both forms.

Li'near-*subulate.* (*Lineari subulatum.*) Partaking of both forms.

LI'NEATE Leaf. (*Lineatum folium.*) In botany *nervis depressis.* The surface slightly marked longitudinally with depressed parallel lines. Lined is improper, as being used in a different sense.—This term has been sometimes confounded with linear, which respects the form of the leaf. The terms being so alike, and this occurring seldom, it may perhaps be better to write—a leaf marked with lines.

LINEA'TION. *s.* (*lineatio*, from *linea*, Lat.) Draught of a line or lines (*Woodward*).

LI'NEN (from *linum*, flax.) In commerce, a well known kind of cloth chiefly made of flax.—Linen was not worn by the Jews, Greeks, or Romans, as any part of their ordinary dress. Under tunics of a finer texture supplied the place of shirts: hence the occasion for frequent bathing. Alexander Severus was the first emperor who wore a shirt: but the use of so necessary a garment did not become common till long after him.

The linen manufacture was probably introduced into Britain with the first settlements of the Romans. The flax was certainly first planted by that nation in the British soil. The plant itself indeed appears to have been originally a native of the east. The woollen drapery would naturally be prior in its origin to the linen; and the

fibrous plants from which the threads of the latter are produced, seems to have been first noticed and worked by the inhabitants of Egypt. In Egypt, indeed, the linen manufucture appears to have been very early: for even in Joseph's time it had risen to a considerable height. From the Egyptians the knowledge of it proceeded probably to the Greeks, and from them to the Romans. Even at this day the flax is imported among us from the eastern nations; the western kind being merely a degenerate species of it.

The principal and almost only linen manufacture in the British dominions is in Ireland, whence prodigious quantities of linens are exported. It is of great importance, however, in order to succeed in the linen manufacture, that one set of people should be confined to the ploughing and preparing the soil, sowing and covering the seed, to the weeding, pulling, rippling, and taking care of the new seed, and watering and dressing the flax till it is lodged at home; others should be employed in the drying, breaking, scutching, and heckling the flax, to fit it for the spinners; and others in spinning and reeling it, to fit it for the weaver: others should be concerned in taking due care of the weaving, bleaching, beetling, and finishing the cloth for the market. It is reasonable to believe, that if these several branches of the manufacture were carried on by distinct dealers in those places, where our home-made linens are manufactured, the several parts would be better executed, and the whole would be afforded cheaper, and with greater profit to the manufacturer. See Bleaching, Weaving, &c.

Spinning flax has been brought to such perfection in Ulster, that, according to Dr. Stephenson, twenty hanks, and sometimes thirty, weigh only one pound. He also assures us that a young woman of Comber in the county of Down, spins so fine that sixty-four hanks weigh only one pound; each thread round the reel is two yards and a half long, one hundred threads in each cut, twelve cuts in each hank. Thus the aggregate length of the thread contained in the 64 hanks amounts to more than 74 miles!

For a very long period the linen manufacture was principally confined to Ulster; and it was not till the year 1791 that the regulations of the trade which had been hitherto confined to that province, were extended to the provinces of Leinster, Munster, and Connaught: particular bounties having been given to them for a few years previously to 1791. The importance and extent of the trade may be estimated, therefore, by attending to the following statement of the exports from Ireland between the years 1700 and 1778, and by considering that during that period the manufacture of linen was almost entirely confined to the province of Ulster.

The annual average quantity of linen cloth exported from Ireland from 1700 to 1750, was not four million yards: from 1750 to 1758, the number of yards exported annually was 11,796,361; from 1757 to 1763, 14,511,973; from 1764 to 1770, 17,776,862. The average quantity of yarn exported annually, in the first of the foregoing periods, was 15000 cwt.; in the second, it was 24,328 cwt.; in the third, 33,114 cwt.; in the fourth 32,311 cwt.; in the last, 31,471 cwt.

From 1770 to 1777, the average quantity of cloth exported annually was 20,252,239 yards: and the annual average quantity of yarn exported, during the same seven years, was 31,475 cwt.

From the year 1756 to 1773, England was the market for nearly nine-tenths of the whole Irish exportation.

The foregoing statement is taken from Mr. Arthur Young. The following account will give our readers an opportunity of estimating the annual state of the linen trade, since the year 1777.

An account of the quantity of linen cloth exported from Ireland, from the 25th of March, 1776, to the 5th of January, 1809, inclusive.

| | Years. | Yards. | | Years. | Yards. |
|---|---|---|---|---|---|
| Entered 25th March. | 1777 | 19,714,638 | Enter. 25 Mar. | 1794 | 43,257,764 |
| | 1778 | 21,945,729 | | 1795 | 42,780,840 |
| | 1779 | 18,836,042 | | 1796 | 46,705,313 |
| | 1780 | 18,746,902 | | 1797 | 36,559,746 |
| | 1781 | 14,947,265 | | 1798 | 33,497,171 |
| | 1782 | 24,970,303 | | 1799 | 38,466,289 |
| | 1783 | 16,039,705 | | 1800 | 35,676,908 |
| | 1784 | 24,961,898 | | $\frac{3}{4}$ to | |
| | 1785 | 26,677,647 | | Jan. 5, 1801 | 25,041,516 |
| | 1786 | 28,168,666 | Entered 5th Jan. | 1802 | 37,767,077 |
| | 1787 | 30,728,728 | | 1803 | 35,491,131 |
| | 1788 | 35,487,691 | | 1804 | 37,432,365 |
| | 1789 | 39,344,633 | | 1805 | 42,988,621 |
| | 1790 | 37,222,126 | | 1806 | 43,534,971 |
| | 1791 | 39,718,706 | | 1807 | 39,049,727 |
| | 1792 | 45,581,667 | | 1808 | 40,901,442 |
| | 1793 | 43,312,057 | | 1809 | 43,904,382 |

See, for more on this subject, a very interesting article on the linen and hempen manufactures of Ireland, in the Quarterly Review, vol. i. pp. 419—429.

Linen, *Fossile*. See Asbestos.

LI'NEN. *a.* (*lineus*, Latin.) 1. Made of linen (*Shakspeare*). 2. Resembling linen (*Shakspeare*).

LINEN-DRA'PER. *s.* (*linen* and *draper*.) He who deals in linen.

LING, in ichthyology. See Gadus.

Ling, in botany. See Erica.

Ling. (perhaps from *klein*, German) a termination noting commonly diminution or tenderness; as, kit*ling*, first*ling*, from *langen*, Teut. *to belong*.

LINGEN, a strong town of Westphalia, capital of a county of the same name. It belongs to the king of Prussia, and is seated on the Embs, 30 miles W. of Osnaburgh, and 37 N. of Munster.

*To* LI'NGER. *v. n.* (from lenȝ, Saxon, *long*.) 1. To remain long in languor and pain (*Pope*). 2. To hesitate; to be in suspense (*Milton*). 3. To remain long (*Dry.*) 4. To remain long without any action or determination (*Shakspeare*). 5. To wait long in expectation or uncertainty (*Dry.*) 6. To be long in producing effect (*Shaks.*)

*To* LI'NGER. *v. a.* To protract; to draw out to length: out of use (*Shakspeare*).

LI'NGERER. *s.* One who lingers.

LI'NGERINGLY. *ad.* (from *lingering*.) With delay; tediously (*Hale*).

LI'NGET. *s.* (*lingot*, French.) A small mass of metal (*Camden*).

LI'NGO. *s.* (Portuguese.) Language; tongue; speech (*Congreve*).

LINGUA, (*Lingua*, *æ*, f. from *lingo*, to lick up.) The tongue. See Tongue.

Lingua avis. The seeds of the *Fraxinus*, or ash, are so called from their supposed resemblance to a bird's tongue.

Lingua canina. So called from the resemblance of its leaves to a dog's tongue. See Cynoglossum.

Lingua cervina. See Scolopendrium.

LINGU'ALIS, (*Lingualis*, sc. *musculis*; from *lingua*, a tongue). A muscle of the tongue. It arises from the root of the tongue laterally, and runs forward between the hyoglossus and genio glossus, to be inserted into the tip of the tongue, along with part of the stylo-glossus. Its use is to contract the substance of the tongue, and to bring it backwards.

LINGUA'CIOUS. *a.* (*linguax*, Lat.) Full of tongue; talkative.

LINGUADE'NTAL. *a.* (*lingua* and *dens*, Lat.) Uttered by the joint action of the tongue and teeth (*Holder*).

LINGUATALA. In zoology, a genus of the class vermes, order intestina. Body depressed, oblong; mouth placid before, surrounded with four passages. One species only: found in the lungs of the hare.

LI'NGUIFORM. In botany, applied to the leaf, s. *lingulatum folium*. A tongue-shaped leaf. Linear and fleshy, blunt at the end, convex underneath, and having usually a cartilaginous border, as in *Mesembryanthemum*, *Aloe*, *Hæmanthus coccineus*.

LI'NGUIST. *s.* (from *lingua*, Lat.) A man skilful in languages (*Milton*).

LINGULATE. In botany, a term of Pontedera's. The same with *ligulate*; which see.

LINIMENT, (*Linimentum*, *i.* n. from *lino*, to anoint). An oily substance of a mediate consistence between an ointment and oil, but so thin as to drop. The following are the chief forms.

LINIME'NTUM Ammoniæ Carbonatis. A stimulating liniment, mostly ordered to relieve rheumatic pains, bruises, and paralytic numbness.

L. ammoniæ fortius. A more powerful stimulating application than the former,

acting as a rubifacient. In pleurodynia, indolent tumours, and arthritic pains; it is to be preferred to the middle one.

L. AQUÆ CALCIS. This has been long in use as an application to burns and scalds.

L. CAMPHORÆ COMPOSITUM. An elegant and useful stimulant application in paralytic, spasmotic, and rheumatic diseases.

L. OPIA'TUM. A resolvent anodyne embrocation, adapted to remove indolent tumours of the joints, and those weaknesses which remain after strains and chilblains before they break.

L. SAPONIS COMPOSITUM. This is a more pleasant preparation, to rub parts affected with rheumatic pains, swellings of the joints, &c. than any of the foregoing, and at the same time not inferior, except where a rubifacient is required.

L. SIMPLEX. An emollient application for chapped lips, hands, &c.

LI'NING. *s.* (from *line.*) 1. The inner covering of any thing (*Prior*). 2. That which is within (*Shakspeare*).

LINK. *s.* (*gelencke*, German.) 1. A single ring of a chain (*Prior*). 2. Any thing doubled and closed together. 3. A chain; any thing connecting (*Shakspeare*). 4. Any single part of a series or chain of consequences (*Hale*). 5. A torch made of pitch and hards (*Howel*).

*To* LINK. *v. a.* (from the noun.) 1. To complicate: as, the links of a chain. 2. To unite; to join in concord (*Shakspeare*). 3. To join; to connect (*Pope*). 4. To join by confederacy or contract (*Hook*). 5. To connect; as concomitant (*Tillotson*). 6. To unite or concatenate in a regular series of consequences (*Hooker*).

LI'NKBOY. } *s.* (*link* and *boy.*) A boy
LI'NKMAN. } that carries a torch to accommodate passengers with light (*More. Gay*).

LIN-KIANG-FOU, a city of China, in the province of Kiang-si, seated on the river Yu-ho. It has only four cities of the third class in its district; but is of some note, on account of one of its villages being the general mart for all the drugs sold in the empire. It is 410 miles N. by E. of Canton.

LIN-TCIN-TCHEOU, a city of China, in the province of Chan-tong, seated on the Great Canal. Among the edifices admired here, is an octagonal tower, divided into eight stories, the walls of which are covered on the outside with porcelain; and near this are some temples of beautiful architecture. It is 225 miles S. of Pekin.

LINLITHGOW, a borough, the county-town of Linlithgowshire. It stands on a rising ground, overlooking a lake at its E. end. Here the kings of Scotland had one of their noblest palaces, now in ruins; but here is still shown the room in which Mary, queen of Scots was born. Linlithgow contains about 3,300 inhabitants, and is 16 miles W. of Edinburgh. Long. 3. 34. W. Lat. 56. 0. N.

LINLITHGOWSHIRE, or WEST LOTHIAN, a county of Scotland, bounded on the N. by the Frith of Forth, on the E. by Edinburghshire, on the S.W. by Lanerkshire, and on the W. by Stirlingshire. It extends near 20 miles from N. E. to S.W. and its breadth does not exceed 12, except on the shore of the Forth. This county contains 13 parishes, the largest of which, next to the county town, is Borrowstounness, containing nearly 3,200 inhabitants. The population of the whole county, in 1755, amounted to 16,829; in 1801, it amounted to 17,844, the increase being rather more than a sixteenth in about half a century.

LINN. In botany. See ELICHAYSUM.

LINNÆ'A. In botany, a genus of the class didynamia, order angiospermia. Calyx double; that of the fruit two-leaved, inferior; of the flower five-parted, superior; corol companulate; berry dry, three-celled; one species: a native of Europe, and common to our own wood; with creeping filiform stems; flowers in pairs, nodding, variegated with white and red.

LINNÆUS. See LINNE.

LINNE, a town of Germany, in the archbishopric of Cologne, 32 miles N. N. W. of Cologne.

LINNE (Carl von), LINNEUS, or LINNÆUS, a most eminent botanist and natural historian, was born on May 24, 1707, in a village called Raeshault or Rashult, in Smaland, where his father, Nicholas Linné, was then vicar, but afterwards preferred to the curacy of Stenbrohult. We are told, that on the farm where Linné was born, there yet stands a large lime-tree, from which his ancestors took the surnames of Tiliander, Lindelius, and Linnæus; and that this origin of surnames, taken from natural objects, is not uncommon in Sweden.

This eminent man, whose talents enabled him to reform the whole science of natural history, accumulated, very early in life, some of the highest honours that await the most successful proficients in medical science; since we find that he was made professor of physic and botany, in the university of Upsal, at the age of 34; and six years afterwards, physician to his sovereign the late King Adolphus; who, in the year 1753, honoured him still farther, by creating him knight of the order of the Polar Star. His honours did not terminate here: for, in 1757, he was ennobled; and, in 1776, the late king of Sweden accepted the resignation of his office, and rewarded his declining years by doubling his pension, and by a liberal donation of landed property settled on him and his family.

The first part of his academical education Linné received under professor Stobæus, at Lund, in Scania, who favoured his inclinations to the study of natural history. After a residence of about a year, he removed, in 1728, to Upsal. Here he soon contracted a close friendship with Artedi, a native of the province of Angermania, who had already been four years a student in that university, and, like himself, had a strong bent to the study of natural history in general, but particularly to ichthyology. Soon after his residence at Upsal, he was also happy enough to obtain the favour of several gentlemen of

established character in literature. He was in a particular manner encouraged in the pursuit of his studies by the patronage of Dr. Olaus Celsius, at that time professor of divinity, and the restorer of natural history in Sweden; who not only patronized him in a general way, but admitted him to his house, his table, and his library. Under such encouragement it is not strange that our author made a rapid progress both in his studies and the esteem of the professors.

In the year 1731, the Royal Academy of Sciences at Upsal, having for some time meditated the design of improving the natural history of Sweden, at the instance particularly of professors Celsius and Rudbeck, deputed Linné to make the tour of Lapland, with the sole view of exploring the natural history of that arctic region; to which undertaking, his reputation, already high as a naturalist, and the strength of his constitution, equally recommended him. He left Upsal the 13th of May, and took his route to Gevalia or Gevels, the principal town of Gestricia, 45 miles distant from Upsal. Hence he travelled through Helsingland into Medalpadia.

His journies from Lula and Pitha on the Bothnian gulf, to the north shore, were made on foot; and he was attended by two Laplanders, one his interpreter, and the other his guide.—Linné thus spent the greater part of the summer in examining this arctic region, and those mountains on which, four years afterwards, the French philosophers secured immortal fame to Sir Isaac Newton. At length, after having suffered incredible fatigues, he returned to Tornoa in September. He did not take the same route from Tornoa as when he came into Lapland, having determined to visit and examine the country on the eastern side of the Bothnian gulf: his first stage, therefore, was to Ula in East Bothnia; from thence to Old and New Carleby, 84 miles south from Ula. He continued his route through Wasa, Christianstadt, and Biorneburgh, to Abo, a small university in Finland. Winter was now setting in apace; he therefore crossed the gulf by the island of Aland, and arrived at Upsal in November, after having performed, and that mostly on foot, a journey of ten degrees of latitude in extent, exclusively of those deviations which such a design rendered necessary.

In 1733, he visited and examined the several mines in Sweden; and made himself so well acquainted with mineralogy and the docimastic art, that we find he was sufficiently qualified to give lectures on those subjects upon his return to the university. The outlines of his system on mineralogy, appeared in the early editions of the *Systema Naturæ;* but he did not exemplify the whole until the year 1768.

In the year 1734, Linné was sent by Baron Reuterholm governor of Dalecarlia, with several other naturalists in that province, to investigate the natural productions of that part of the Swedish dominions; and it was in this journey that our author first laid the plan of an excellent institution, which was afterwards executed, in a certain degree at least, by himself, with the assistance of many of his pupils, and the result published under the title of *Pan Suecus*, in the second volume of the *Amœnitates Academicæ*.

In 1735, Linné travelled over many other parts of Sweden, some parts of Denmark and Germany, and fixed in Holland, where he chiefly resided until his return to Stockholm, about the year 1739. In 1735, the year in which he took the degree of M. D. he published the first sketch of his *Systema Naturæ*, in a very compendious way, and in the form of tables only, in 12 pages in folio. By this it appears, that he had, at a very early period of his life (certainly before he was 24 years old), laid the basis of that great structure which he afterwards raised, not only to the increase of his own fame, but to that of natural science.

In 1736, Linné came into England, and visited Dr. Dillenius, the late learned professor at Oxford, whom he justly considered as one of the first botanists in Europe. He mentions with particular respect the civilities he received from him, and the privileges he gave him of inspecting his own and the Sherardian collections of plants. It is needful to say, that he visited Dr. Martyn, Mr. Rand, and Mr. Miller, and that he was in a more singular manner indebted to the friendship of Dr. Isaac Lawson. He also contracted an intimate friendship with Mr. Peter Collinson.

One of the most agreeable circumstances that happened to Linné during his residence in Holland, arose from the patronage of Mr. Clifford, in whose house he lived a considerable part of his time, being now as it were the child of fortune:—"Exivi patriâ triginta sex nummis aureis dives," are his own words. With Mr. Clifford, however, he enjoyed pleasures and privileges scarcely at that time to be met with elsewhere in the world; that of a garden excellently stored with the finest exotics, and a library furnished with almost every botanic author of note.

Early in the year 1738, after Linné had left Mr. Clifford, and, as it should seem, when he resided with Van Royen, he had a long and dangerous fit of sickness; and, upon his recovery, went to Paris, where he was properly entertained by the Jussieus, at that time the first botanists in France. The opportunity this gave him of inspecting the Herbaria of Surian and Tournefort, and those of the above-named gentlemen, afforded him great satisfaction.

Our author did not fail to avail himself of every advantage that access to the several museums of this country afforded him, in every branch of natural history; and the number and importance of his publications, during his absence from his native country, sufficiently demonstrate that fund of knowledge which he must have imbibed before, and no less testify his extraordinary application. These were, *Systema Naturæ*, *Fundamenta Botanica*, *Bibliotheca Botanica*, and *Genera Plantarum*, the last of which is justly considered as the most valuable of all the works of this celebrated author. What immense application had been bestowed upon it, the reader may easily conceive, on being informed, that before the publication of the first edition, the author had examined the characters of 8000 flowers. The last book of Linné's composition, published during his stay in Holland, was the *Classes Plantarum*, which is a copious illustration of the second part of the *Fundamenta.*

About the latter end of the year 1738, or the beginning of the next, our author settled as a physician at Stockholm; where he seems to have met with considerable opposition, and was oppressed with many difficulties; but all of these at length he overcame, and got into extensive practice; and soon after his settlement married

the lady before spoken of. By the interest of Count Tessin, who was afterwards his great patron, and even procured medals to be struck in honour of him, he obtained the rank of physician to the fleet, and a stipend from the citizens for giving lectures in botany. And what at this time especially was highly favourable to the advancement of his character and fame, by giving him an opportunity of displaying his abilities, was the establishment of the Royal Academy of Sciences at Stockholm; of which Linné was constituted the first president, and to which establishment the king granted several privileges, particularly that of free postage to all papers directed to the secretary. By the rules of the academy, the president held his place but three months. At the expiration of that term, Linné made his *Oratio de memorabilibus in Insectis*, Oct. 3, 1739; in which he endeavours to excite an attention and inquiry into the knowledge of insects, by displaying the many singular phenomena that occur in contemplating the nature of those animals, and by pointing out, in a variety of instances, their usefulness to mankind in particular, and to the economy of nature in general.

During all this time, however, Linné appears to have had his eye upon the botanic and medical chair at Upsal, at this time occupied by Rudbeck, who was far advanced in life. In course of time, he obtained his wish. In the year 1741, upon the resignation of Roberg, he was constituted joint professor of physic and physician to the king, with Rosen, who had been appointed in the preceding year on the death of Rudbeck. These two colleagues agreed to divide the medical departments between them; and their choice was confirmed by the university. Rosen took anatomy, physiology, pathology, and the therapeutic part; Linné, natural history, botany, materia medica, the dietetic part, and the diagnosis morborum.

During the interval of his removal from Stockholm to Upsal, in consequence of this appointment, our professor was deputed by the states of the kingdom to make a tour to the islands of Oëland and Gothland, in the Baltic, attended by six of the pupils, commissioned to make such inquiries as might tend to improve agriculture and arts in the kingdom, to which the Swedish nation had for some time paid a particular attention. The result of this journey was very successful, and proved fully satisfactory to the states, and was afterwards communicated to the public. On his return he entered upon the professorship, and pronounced before the university his oration, *De peregrinationum intra patriam necessitate*, Oct. 17, 1741; in which he forcibly displays the usefulness of such excursions, by pointing out to the students that vast field of objects which their country held out to their cultivation, whether in geography, physics, mineralogy, botany, zoology, or economics, and by showing the benefit that must accrue to themselves and their country as rewards to their diligence. That animated spirit which runs through the whole of this composition, renders it one of the most pleasing and instructive of all our author's productions.

Linné was now fixed in the situation that was the best adapted to his character, his taste, and abilities; and which seems to have been the object of his ambition, and centre of his hopes. Soon after his establishment, he laboured to get the academical garden, which had been founded in 1657, put on a better footing, and very soon affected it; procuring also a house to be built for the residence of the professor. The whole had been in ruin ever since the fire in 1702; and at the time Linné was appointed professor of botany, the garden did not contain above 50 plants that were exotic. His correspondence with the first botanists in Europe, soon supplied him with great variety. He received Indian plants from Jussieu of Paris, and from Van Rayen of Leyden; European plants from Haller and Ludwig; American plants from the late Mr. Collinson, Mr. Catesby, and others; and variety of annuals from Dillenius: in short, how much the garden owed to his diligence and care in a few years, may be seen in the catalogue published under the title of "Hortus Upsaliensis, exhibens plantas exoticas horto Upsaliensis Academiæ a sese (Linnæo) illatas ab anno 1742, in annum 1748, additis, differentiis synonymis, habitationibus, hospitiis, rariorumque descriptionibus, in gratiam studiosæ juventutis;" Holm. 1748, 8vo. p. 306. tab. 3. By this catalogue it appears, that the professor had introduced 1100 species, exclusively of all the Swedish plants, and of varieties; which latter, in ordinary gardens, amount not unfrequently to one-third of the whole number. The preface contains a curious history of the climate at Upsal, and the progress of the seasons throughout the whole year.

The fame which our author had now acquired by his *Systema Naturæ*, of which a sixth edition, much enlarged, had been published at Stockholm, in 1748, in 8vo. p. 232, with eight tables explanatory of the classes and orders (and which was also republished by Gronovius, at Leyden), had brought, as it were, a conflux of every thing rare and valuable in every branch of nature, from all parts of the globe, into Sweden. The king and queen of Sweden had their separate collections of rarities; the former at Ulricksdahl; the latter, very rich in exotic insects and shells, procured at a great expence, at the palace of Drottningholm; both of which our author was employed in arranging and describing. Besides these, the museum of the Royal Academy of Upsal, had been augmented by a considerable donation from the king, whilst hereditary prince, in 1746; by another from Count Gyllenborg the year before; by a third from M. Grill, an opulent citizen of Stockholm.

From this time we see the professor in a more elevated rank and situation in life. His reputation had already procured him honours from almost all the royal societies in Europe: and his own sovereign, truly sensible of his merit, and greatly esteeming his character and abilities, favoured him with a mark of his distinction and regard, by creating him a knight of the Polar Star. It was no longer *laudatur et alget*. His emoluments kept pace with his fame and honours: his practice in his profession became lucrative; and we find him soon after possessed of his country-house and gardens at Hammarby, about five miles from Upsal. He had moreover received one of the most flattering testimonies of the extent and magnitude of his fame that perhaps was ever shown to any literary character, the state of the nation which conferred it, with all its circumstances, duly considered. This was an invitation to Madrid, from the king of Spain, there to preside as a naturalist, with the

offer of an annual pension for life of 2000 pistoles, letters of nobility, and the perfect free exercise of his own religion: but, after the most perfect acknowledgments of the singular honour done him, he returned for answer, 'that if he had any merits, they were due to his own country.'

In the year 1755, the Royal Academy of Sciences at Stockholm, honoured our professor with one of the first premiums, agreeably to the will of Count Sparree; who had decreed two gold medals, of ten ducats value each, to be annually given by the academy to the authors of such papers, in the preceding year's Stockholm Acts, as should be adjudged most useful in promoting agriculture particularly, and all branches of rural economy. This medal bore ou one side the arms of the count, with this motto, *Superstes in scientiis amor Frederici Sparre.* Linné obtained it in consequence of a paper, *De plantis quæ Alpium Suecicarum indigenæ, magna rei œconomicæ et medicæ emolumento fieri possint;* and the ultimate intention was to recommend these plants, as adapted to culture in Lapland. This paper was inserted in the Stockholm Acts, for 1754, vol. xv. Linné also obtained the *præmium centum aureorum,* proposed by the Imperial Academy of Sciences at Petersburgh, for the best paper written to establish or disprove, by new arguments, the doctrine of the sexes of plants.

About the close of 1776, he was seized with an apoplexy, which left him paralytic; and at the beginning of the year 1777, he suffered another stroke, which very much impaired his mental powers. But the disease, supposed to have been the more immediate cause of his death, was an ulceration of the urinary bladder; of which, after a tedious indisposition, he died, Jan. 11, 1778, in the 71st year of his age.—His principal other works, beside those already mentioned, are, The *Iter Oëlandicum et Gotlandicum, Iter Scanicum, Flora Suecica, Fauna Suecica, Materia Medica, Philosophia Botanica, Genera Morborum,* different papers in the *Acta Upsaliensia,* and the *Amœnitates Academicæ.* The last of this great man's treatises was the *Mantissa Altera,* published in 1771: but before his death he had finished the greatest part of the *Mantissa Tertia,* afterwards completed and published by his son.

Nature had, in an eminent manner, been liberal in the endowments of Linné's mind. He seems to have been possessed of a lively imagination, corrected however by a strong judgment, and guided by the laws of system. Add to these, the most retentive memory, and unremitting industry, and the greatest perseverance in all his pursuits; as is evident from that continued vigour with which he prosecuted the design, that he appears to have formed so early in life, of totally reforming and fabricating anew the whole science of natural history; and this fabric he raised, and gave to it a degree of perfection unknown before; and had moreover the uncommon felicity of living to see his own structure rise above all others, notwithstanding every discouragement its author at first laboured under, and the opposition it afterwards met with. Neither has any writer more cautiously avoided that common error of building his own fame on the ruin of another man's. He every where acknowledged the several merits of each author's system; and no man appears to have been more sensible of the partial defects of his own. Those anomalies which had principally been the objects of criticism, he well knew every artificial arrangement must abound with; and having laid it down as a firm maxim, that every system must finally rest on its intrinsic merit, he willingly commits his own to the judgment of posterity. Perhaps there is no circumstance of Linné's life which shows him in a more dignified light than his conduct towards his opponents. Disavowing controversy, and justly considering it as an unimportant and fruitless sacrifice of time, he never replied to any, numerous as they were at one season.

To all who see the aid this extraordinary man has brought to natural science, his talents must appear in a very striking point of view; but more especially to those who, from similarity of taste, are qualified to see more distinctly the vast extent of his original design, the greatness of his labour, and the elaborate execution he has given to the whole. He had a happy command of the Latin tongue, which is alone the language of science; and no man ever applied it more successfully to his purposes, or gave to description such copiousness, united with that precision and conciseness which so eminently characterise his writings.

Linné lived to enjoy the fruit of his own labour in an uncommon degree. Natural history raised itself in Sweden, under his culture, to a state of perfection unknown elsewhere; and was from thence disseminated through all Europe. His pupils dispersed themselves all over the globe; and, with their master's fame, extended both science and their own. More than this, he lived to see the sovereigns of Europe establish several public institutions in favour of this study, and even professorships established in divers universities for the same purpose, which do honour to their founders and patrons, and which have excited a curiosity for the science, and a sense of its worth, that cannot fail to further its progress, and in time raise it to that rank which it is entitled to hold among the pursuits of mankind.

LINNET, in ornithology. See FRINGILLA.

LINNEUS. See LINNE.

LIN'OCIERA. In botany, a genus of the class diandria, order monogynia. Calyx four-toothed; corol four-petalled; anthers connecting two opposite petals at the base: berry two-celled, the cells two-seeded. One species a native of the West Indies.

LINAS, a kind of rustic air used by the ancient Greeks.

LINSEED, the seed of flax. See LINUM.

LI'NSEYWOOLSEY. *a.* (*linen* and *wool.*) Made of linen and woollen mixed; vile; mean; of different and unsuitable parts (*Pope*).

LINSPINS, or LINCHPINS, in the military art, small pins of iron which keep the wheel of a cannon, or waggon, on the axletree; for when the end of the axletree is put through the nave, the linspin is put in to keep the wheel from falling off.

LINSTOCK, in the military art, a wooden staff, about three feet long, upon one end of which is a piece of iron which divides in two, turning from one to another, having each a place to receive a match, and a screw o keep it fast: the other end is pointed,

and shod with iron, to stick in the ground. It is used by gunners to fire the guns.

LINT, linum, from the flax of which linen is made.

In surgery, the term lint denotes the scrapings of linen which is used in dressing wounds, and is made up in various forms, as tents, dossils, pledgets, &c. See SURGERY.

LIN-TCHEOU-FOU, a city of China, in the province of Kiang-nan; including, in its jurisdiction, two cities of the second, and six of the third class.

LIN-TCHIN-TCHEOU, a city of China, in the province of Chan-tong, seated on the Great Canal. Among the edifices admired here, is an octagonal tower, divided into eight stories, the walls of which are covered on the outside with porcelain; and near this are some temples of beautiful architecture. It is 225 miles S. of Pekin.

LINTZ, a very handsome town of Germany, and capital of Upper Austria, with two fortified castles; the one upon a hill, the other below it. Here is a hall in which the states assemble, a bridge over the Danube, a manufacture of gunpowder, and several other articles. It was taken by the French in 1741, but the Austrians retook it in the following year. Lon. 14. 33. E. Lat. 48. 16. E.

LINTEL. s. (*linteal*, French.) That part of the door frame that lies cross the door posts over head (*Pope*).

LINUM. Flax. In botany, a genus of the class pentandria, order pentagynia. Calyx five-leaved; petals five; capsule superior, ten-valved, ten-celled; seeds solitary. Twenty eight species, some few with opposite, the generality with alternate leaves. Some of the species are found in every quarter of the globe; four in the dry pastures, mountains, and corn fields of our own country. The following are the chief:

1. L. perenne. Siberian, perennial flax. Leaflets of the calyx obovate, obtuse, about five-nerved, glabrous; stems ascending and numerous; flowers in umbels, large and of a blue colour. A native of England.

2. L. Catherticum. Purging-flax or mill-mountain. Leaves opposite, obovate-lanceolate; stem forked above, about five inches long; petals acute. Found wild in the dry pastures, and on the chalky hills of our own country.

3. L. utitatissimum. Common flax. Leaflets of the calyx ovate, acute, three-nerved; petals crenate; leaves lanceolate, alternate; stem almost solitary.

The culture and management of the common flax is a considerable part of husbandry. It succeeds best upon a rich soil, that has not been ploughed for some years. The ground should be kept clear of weeds, well ploughed, and laid flat and even, just before the season for sowing the flax seed; which is about the end of March. The common way of sowing is in broad cast, allowing from two or three bushels of seed to an acre of land; but sowing the seed in drills, about ten inches distance from each other, is a better method. After the seed is sown, the ground should be hoed to destroy the weeds. Towards the end of August, the flax will begin to ripen; it should then be pulled up as soon as the heads begin to change brown, and hang downwards, otherwise the seeds will soon scatter, and be lost. If the flax be pulled when it first begins to flower, it will be whiter than if it stand till the seed is ripe; but in this case the seed will be lost.

In medicine, this vegetable has been long employed on account of the utility of its emollient and mucilaginous seeds. They have an unctuous, sweetish taste but no remarkable smell; on expression they yield a large quantity of oil, which, when carefully drawn, without the application of heat, has no particular taste or flavour: boiled in water they yield a large proportion of a strong flavourless mucilage, which is in use as an emollient or demulcent in coughs, hoarsenesses, and pleuritic symptoms, that frequently prevail in catarrhal affections; and it is likewise recommended in nephritic pains and stranguries. The meal of the seeds is also much used externally in emollient and maturating cataplasms. The expressed oil is an officinal preparation, and is supposed to be of a more healing and balsamic nature than the other oils of this class: it has, therefore, been very generally employed in pulmonary complaints, and in colics and constipations of the bowels.

LINUS. This name is common to different persons whose history is confused, and who are often taken one for the other. One was son of Urania and Amphimarus, the son of Neptune. Another was son of Apollo, by Psammathe, daughter of Crotopus, king of Argos. The third, son of Ismenius, and born at Thebes in Bœotia, taught music to Hercules, who, in a fit of anger, struck him on the head with his lyre, and killed him. He was son of Mercury and Urania, according to Diogenes, who mentions some of his philosophical compositions, in which he asserted that the world had been created in an instant. He was killed by Apollo, for presuming to compare himself to him.

LION, in mastiology. See FELIS.

LION, in astronomy. See LEO.

LION-ANT, in entomology. See MYRMELEIN.

LION'S FOOT, in botany. See CATANANCHE.

LION'S LEAF. See LEONTICE.

LION'S TAIL. See PHLOMIS.

LIONCELLES, in heraldry, a term used for several lions borne in the same coat of arms.

LIONESS. s. A she lion.

LIOTARD, called the Turk, an eminent painter, was born at Geneva, in 1702, and by his father was designed for a merchant; but, by the persuasion of his friends, who observed the genius of the young man, he

was permitted to give himself up to the art of painting. He went to Paris in 1725, and in 1738 accompanied the marquis de Puisieux to Rome, who was going ambassador to Naples. At Rome he was taken notice of by the earls of Sandwich and Besborough, then lord Duncannon, who engaged Liotard to go with them on a voyage to Constantinople. There he became acquainted with the late lord Edgecumbe, and Sir Everard Fawkener, our ambassador, who persuaded him to come to England, where he staid two years. In his journey to the Levant he had adopted the eastern habit, and wore it here with a very long beard. It contributed much to the portraits of himself, and some thought to draw customers; but he was really a painter of uncommon merit. After his return to the continent, he married a young wife, and sacrificed his beard to hymen. He came again to England in 1772, and brought a collection of pictures of different masters, which he sold by auction, and some pieces of glass, painted by himself, with surprising effect of light and shade, but a mere curiosity, as it was necessary to darken the room before they could be seen to advantage; he affixed, too, as usual, extravagant prices to them. He staid here about two years, as in his former journey. He has engraved some Turkish portraits, one of the empress queen and the eldest arch-duchess, in Turkish habits, and the heads of the emperor and empress. He painted admirably well in miniature; and finely in enamel, though he seldom practised it. But he is best known by his works in crayons. His likenesses were as exact as possible, and too like to please those who sat to him; thus he had great business the first year, and very little the second. Devoid of imagination, and one would think of memory, he could render nothing but what he saw before his eyes. Freckles, marks of the small-pox, every thing found its place; not so much from fidelity, as because he could not conceive the absence of any thing that appeared to him. Truth prevailed in all works, grace in very few or none. Nor was there any ease in his outline; but the stiffness of a bust in all his portraits (*Walpole*).

LIP, in anatomy, the edge or exterior part of the mouth; that musculous extremity which shuts and covers the mouth, both above and below. See Labium.

Lip. 1. The edge of any thing (*Burnet*). 2. *To make a* Lip. To hang the lip in sullenness and contempt (*Shakspeare*).

*To* LIP. *v. a.* To kiss: obsolete (*Shaks.*)

Lip, *Hare*, a disorder or defect, in which the upper lip is in a manner slit or divided, so as to resemble the upper lip of a hare; whence the name. See Surgery.

LIPARA, the largest of the Æolian islands on the coast of Sicily, now called the Lipari. It had a city of the same name, which, according to Diodorus, it received from Liparus, the son of Auson, king of these islands.

LIPARI, the largest, most fertile, and populous of the Lipari Islands, about 15 miles in circumference. It was celebrated among the ancients; and, by the description of Aristotle, it appears to have been considered by the sailors in his time, what Stromboli is in ours, as a lighthouse, as its fires were extinguished. It has not suffered from subterraneous fires for ages past, though it every where bears the marks of its former state. The form of this island is very irregular; and in this volcanic spot such a number of spiracles have been opened, that the greatest part of them are confounded with each other. It abounds with the currant grape; cotton also grows here; and great quantities of pumice are exported.

Lipari, an ancient town, capital of the island of Lipari, with a bishop's see. It was ruined in 1544, by Barbarossa, who carried the inhabitants into slavery, and demolished the place; but it was rebuilt by the emperor Charles V. The principal trade of the inhabitants is in the exportation of the products of the island; but the chief necessaries of life are imported from Sicily. This town has a garrison, and stands on the S. side of the island. Long. 15. 30. E. Lat. 38. 35. N.

Lipari Islands, a cluster of islands in the Mediterranean, which take their name from their principal, about eight leagues from the north coast to the island of Sicily. These islands were called, by the ancients, *Æoliæ*, *Vulcaniæ*, and *Insulæ Liparæorum*, and feigned to be the residence of Æolus and Vulcan.

LIPARIS, (*Liparis*, *is*, f. λιπαρις, from λιπος, fat, so named from its unctuous quality). See Pinguicula.

LIPAROCELE, (*Liparocele*, *es*, f. λιπαροκηλη, from λιπος, fat and κηλη, a tumour). That species of sarcocele in which the substance constituting the disease is fat.

LIPLA'BOUR. *s.* (*lip* and *labour*.) Action of the lips without concurrence of the mind; words without sentiments (*Taylor*).

LIPOMA, (*Lipoma*, *ătis*, n. from λιπος, fat). A solitary, soft, unequal, indolent tumour, arising from a luxuriancy of adeps in the celular membrane. The adipose structure forming the tumour is sometimes diseased towards its centre, and more fluid than the rest. At other times it does not appear to differ in any respect from adipose membrane, except in the enlargement of the cells containing the fat. These tumours are always many years before they arrive at any size.

LIPO'THYMOUS. *a.* (λειπω and θυμὸς.) Swooning; fainting (*Harvey*).

LIPO'THYMY. *s.* (λειποθυμία. Swoon; fainting fit (*Taylor*).

LIPPA, a town of Hungary, with a castle. It was taken by the Turks in 1552; by the

Imperialists in 1688; and by the Turks again in 1691; who abandoned it in 1695, after having demolished the fortifications. It is seated on a mountain, in Long. 21. 55. E. Lat. 36. 5. N.

LIPPA'RIA. In botany, a genus of the class diadelphia, order decandria. Calyx five-cleft, the lowest segment elongated; wings of the cone two lobed below, larger stamens with three shorter teeth; legume ovate. Thirteen species, all shrubs of the Cape, with umbelled, spiked, fascicled, racemed, axillary, or terminal flowers.

LIPPE, the capital of a country of the same name in Germany, and in the circle of Westphalia. It is seated on a river of the same name, and was formerly the residence of the principal branch of the house of Lippe. It is now in the possession of the king of Prussia, and carries on a good trade in preparing timber for building vessels on the Rhine, with which it has a communication by the river Lippe. The country round it is unwholesome and marshy. Long. 8. 12. E. Lat. 51. 43. N.

LIPPED. *a.* (from *lips.*) Having lips.

LIPPI (Filippo), called the Old, an historical painter, born at Florence in 1421, and died in 1488. He was at first a monk; but the sight of Massaccio painting a picture in his convent inspired him with a love of the art, and he abandoned his cell to put himself under the instruction of that master, whose style he imitated with great success. He was for some time a captive in Barbary, and on his return to Europe was employed by the grand duke of Tuscany. He was a man of loose morals, and was poisoned by the friends of a man whom he had enticed from a convent and debauched.

Lippi (Lorenzo), a painter and poet, was born in 1606, and died in 1664. He painted many fine pictures at Florence for the chapels and convents; and at the court of Inspruck he painted a number of portraits of the first nobility, which were much admired. He also wrote a burlesque poem, entitled, Malmantile Raquistato, printed at Florence in 1688, 4to.

LI'PPIA. In botany, a genus of the class didynamia, order angiospermia. Calyx four-toothed, roundish, erect, compressed and membranaceous; capsule two-celled, two-seeded, straight. Five species, American or West-Indian shrubs.

LIPPITUDE, (*Lippitudo. inis,* f. from *lippus*, blear-eyed.) An exudation of a puriform humour from the margin of the eye-lids. The proximate cause is a deposition of acrimony on the glandulæ meibomianæ in the margin of the eyelids. This humour in the night agglutinates the tarsi of the eyelids together. The margins of the eyelids are red and tumefy, are irritated and excite pain. An ophthalmia, fistula lachrymalis, and sometimes an ectopium, are the consequences. The species of the lippitudo are, 1st. *Lippitudo infantum*, which is familiar to children, particularly of an acrimonious habit. The lippitude of infants is mostly accommpanied with tinea, or some scabby eruption, which points out that the disease originates, not from a local, but general or constitutional affection; 2d. *Lippitudo adultorum or senilis.* This arises from various acrimonies, and is likewise common to hard drinkers: 3d. *Lippitudo venerea*, which arises from a suppressed gonorrhœa or fluor albus, and is likewise observed in children born of parents with venereal complaints: 4th. *Lippitudo scrophulosa*, which accompanies other scrophulous systems: 5th. *Lippitudo scorbutica*, which affects the scorbutic, and is cured by the means used for the sea or land scurvy. Vegetable diet and pure air, fresh meats, and exercise, for the former; but mineral alteratives, antiphlogistics, and a dry strict regimen, is the cure for the latter.

LIPPLEHORT, in botany. See Cassine.

LIPSIUS (Justus), a learned critic, was born at Isch, a small village near Brussels, in 1547. After having distinguished himself in polite literature, he became secretary to cardinal de Granvellan at Rome, where the best libraries were open to him; and he spent much labour in collating the MSS. of ancient authors. He lived 13 years at Leyden, during which he composed and published what he esteemed his best works; but settled at Louvain, where he taught polite literature with great reputation. He was remarkable for unsteadiness in religion, fluctuating often between the Protestants and Papists; but he became finally a bigoted catholic. He died at Louvain in 1606; and his works are collected in six volumes folio.

LI'PWISDOM. *s.* (*lip* and *wisdom.*) Wisdom in talk without practice (*Sidney*).

LI'QUABLE. *a.* (from *liquo*, Latin.) Such as may be melted.

LIQUA'TION. *s.* (from *liquo*, Latin.) 1. The act of melting. 2. Capacity to be melted (*Brown*).

*To* LI'QUATE. *v. n.* (*liquo*, Latin.) To melt; to liquefy (*Woodward*).

LIQUEFA'CTION. *s.* (*liquefactio*, Latin.) The act of melting; the state of being melted (*Bacon*).

In speaking of metals, the reduction of *them* from the solid to the liquid state is usually termed *fusion.*

LI'QUEFIABLE. *a.* (from *liquefy.*) Such as may be melted (*Bacon*).

*To* LI'QUEFY. *v. a.* (*liquefier*, French.) To melt; to dissolve (*Bacon*).

*To* LI'QUEFY. *v. n.* To grow liquid. (*Addison*).

LIQUE'SCENCY, *s.* (*liquescentia*, Latin.) Aptness to melt.

LIQUE'SCENT. *a.* (*liquescens*, Latin.) Melting.

LI'QUID. *a.* (*liquide*, French.) 1. Not

solid; not forming one continuous substance; fluid (*Daniel*). 2. Soft; clear (*Crashaw*). 3. Pronounced without any jar or harshness (*Dryden*). 4. Dissolved, so as not to be obtainable by law (*Ayliffe*).

Liquid, a body which has the property of fluidity; and, besides that, a peculiar quality of wetting other bodies immerged in it, arising from some configuration of its particles, which disposes them to adhere to the surfaces of bodies contiguous to them. Some distinguish *liquids* from *fluids*, by reckoning the former incompressible, the latter compressible. See Fluid.

Liquid, among grammarians, is a name applied to certain consonants opposed to mutes. Thus l, m, n, and r, are liquids.

LIQUIDAMBAR. In botany, a genus of the class monoecia, order polyandria. Male; calyx common, four-leaved; corolless; filaments numerous. Fem; calyx in a globe; four-leaved; corolless; styles two; capsules numerous in a globe, two-valved, many-seeded. Two species;

1. L. imberbe. Beardless Liquidambar. Leaves palmate-lobed, with the sinules of the base of the veins glabrous. A native of the East; and at this time cultivated in his majesty's garden at Kew.

2. L. Styraciflua. Styraxoozing Liquidambar. Sweet gum-tree. Leaves palmate-lobed, with the sinuses of the base of the veins villous. A native of North and South America. It rises to the height of forty or fifty feet with great regularity, and produces terminal flowers of a saffron hue, succeeded by a large, brown fruit. The leaves which are deciduous emit an exquisite odour, and the stem yields a resinous juice of nearly equal fragrance. This exudation is of a yellow colour inclining to red; at first of a turpentine consistence, but hardening by age into a solid brittle mass. It has a moderately pungent, warm, balsamic taste, and a very fragrant smell, not unlike that of the *Storax calamita* heightened by a little ambergris. It is seldom used medicinally. The *Styrax liquida* is also obtained by boiling from this plant. There are two sorts distinguished by authors; the one, the purer part of the resinous matter that rises to the surface in boiling, separated by a strainer, of the consistence of honey, tenacious like turpentine, of a reddish or ash-brown colour, moderately transparent, of an acrid unctuous taste, and a fragrant smell, faintly resembling that of the solid storax, but somewhat disagreeable. The other, the more impure part which remains on the strainer, untransparent, and in smell and taste much weaker than the former. Their medical use is chiefly as stomachics, in the form of plaster.

LIQUIDAMBER. See Liquidambar.

Liquidamber styraciflua. The systematic name of the tree which affords both the liquidamber and liquid storax. See Liquidambar.

*To* LI'QUIDATE. *v. a.* (from *liquid.*) To clear away; to lessen debts.

LI'QUIDITY. *s.* (from *liquid.*) Subtilty; thinness (*Glanville*).

LI'QUIDNESS. *s.* (from *liquid.*) Quality of being liquid: fluency (*Boyle*).

LI'QUOR. *s.* (*liquor*, Lat.) 1. Any thing liquid (*Milton*). 2. Strong drink: in familiar language.

*To* LI'QUOR. *v. n.* (from the noun.) To drench or moisten (*Bacon*).

Liquor amnii, (*Liquor, ōris*, m.) All that fluid which is contained in the membranaceous ovum surrounding the fetus in utero, is called by the general name of the waters, the water of the amnion or ovum, or liquor amnii. The quantity, in proportion to the size of the different parts of the ovum, is greatest by far in early pregnancy. At the time of parturition, in some cases, it amounts to or exceeds four pints, and in others it is scarcely equal to as many ounces. It is usually in the largest quantity when the child has been some time dead, or is born in a weakly state. This fluid is generally transparent, often milky, and sometimes of a yellow or light brown colour, and very different in consistence; and these alterations seem to depend upon the state of the constitution of the parent. It does not coagulate with heat like the serum of the blood; and, chemically examined, it is found to be composed of phlegm, earthy matter, and sea salt, in different proportions in different subjects, by which the varieties in its appearance and consistence are produced. It has been supposed to be excrementitious; but it is generally thought to be secreted from the internal surface of the ovum, and to be circulatory as in other cavities. It is supposed by many physiologists that the fetus is nourished by this fluid, of which it is said to swallow some part frequently; and it is also asserted, that the qualities of the fluid are adapted for its nourishment yet there have been some examples, of children born without any passage to the stomach; and a few, of children in which the head was wanting, and which have nevertheless arrived at the full size.

These cases should seem to oppose the theory that the child is nourished by the amnios: but as several cases have also occurred in which the fetus has been born without a funis, and consequently without any attachment to its mother, or means of deriving nutriment from her blood, we are still at a loss upon the subject, unless we indulge a conjecture that in all cases the fetus derives its nutrition from the amnios; and, in the case of headless monsters through the medium of the cutaneous absorbents, or some other channel unnoticed by those who have been in possession of such deformities.

A very decided case of a fetus without a funis was published a few years ago by Mr. Good, and has been supposed to be nearly sufficient to set the question at rest.

The known uses of this fluid are, to serve the purpose of affording a soft bed for the residence of the fetus, to which it allows free motion, and prevents any external injury during pregnancy: and to produce the gentle, yet efficacious dilatation of the os uteri, and soft parts, at the time of parturition. Instances have been recorded, in which the waters of the ovum are said to have been voided so early as in the sixth month of pregnancy, without prejudice even to the child or parent. The truth of these reports seems to be doubtful, because, when the membranes are intentionally broken, the action of the uterus never fails to succeed, at least, when all the water is evacuated. "A few cases have occurred to me, says Dr. Denman, in practice, which might have been construed to be of this kind; for there was a daily discharge of some colourless fluid from the vagina for several months before delivery; but there being no diminution of the size of the abdomen, and the waters being regularly discharged at the time of labour, it was judged that some lymphatic vessel near the os uteri had been ruptured, and did not close again till the patient was delivered." He also met with one case, in which, after the expulsion of the placenta, there was no sanguineous discharge, but a profusion of lymph, to the quantity of several pints, in a few hours after delivery; yet the patient suffered no inconvenience except from surprise.

Liquor *of Libavius*. See Stannum and Tin.

Liquor volatilis cornu cervi. This preparation of the volatile alkali, commonly termed hartshorn, possesses the same virtues as the aqua ammoniæ. It is in common use to smell at in faintings, &c. See Carbonas ammoniacæ liquidus.

LIQUORICE. See Glycyrrhiza and Astragalus.

Liquorice, Spanish. See Glycyrrhiza.

Liquorice *Vetet, knob-rooted.* See Glycine.

Liquorice, *wild.* See Capraria.

LIRIODENDRON. Tulip-tree. In botany, a genus of the class polyandria, order polygamia. Calyx generally three-leaved; petals six; seeds ending in a scale, imbricate into a strobile. Four species, natives of America or China. The species best known and most commonly propagated is L. tulipfera. Leaves three-lobed, truncate; calyx three-leaved. It is a native of North America, rising with a large, upright trunk that branches forty or fifty feet high; the trunk is ovated with a grey bark; the leaves are four or five inches long, and their breadth nearly equal. Propagated in our own country, the tree flowers in July, the flowers are terminal; the corol consists of six petals, and like that of the tulip is spotted or striped with red green, white, or yellow. The corol is succeeded by a large cone, which never ripens in England.

LIRIOPE, one of the Oceanides, mother of Narcissus by the Cephisus. (*Ovid.*)—A fountain of Bœotia on the borders of Thespis, where Narcissus was drowned, according to some accounts.

LIS (*La*), a river of France, which rises near Lisburg, in the department of the Straits of Calais, passes by Aire, St. Venant, Armentieres, Comines, &c. and runs into the Scheldt, at Ghent.

LISBON, the capital of the kingdom of Portugal, situated in the province of Estremadura, on the banks of the river Tagus, in Long. 9. 10. W. Lat. 38. 42. N. It was anciently called *Olisipo*, *Olysippo*, and *Ulyssipo*, which are supposed to be derived from the Phenician *Ulysubbo*, or *Olisippo*, signifying in that tongue a pleasant bay, such as that on which this city stands. It first became considerable in the reign of king Emmanuel; from that king it had been the capital of the kingdom; the residence of its monarchs, the seat of the chief tribunals and offices of the metropolitan, a noble university, and the receptacle of the richest merchandize of the East and West Indies. Its air is excellent; being refreshed by the delightful sea-breezes, and those of the Tagus. The city extends for about two miles along the Tagus; but its breadth is inconsiderable. Like old Rome, it stands on seven hills: but the streets in general are narrow and dirty, and some of them are very steep; neither are they lighted at night. The churches in general are very fine; but the magnificence of the chapel royal is amazing. Here is one of the finest harbours in the world; and there were a great number not only of fine churches and convents here, but also of other public buildings, and particularly of royal palaces, and others belonging to the grandees; but the greatest part of them, and of the city, were destroyed by a most dreadful earthquake, on November 1, 1755, from which it will require a long time to recover. The inhabitants, before the earthquake, did not at most exceed 150,000. The government of it is lodged in a council, consisting of a president, six counsellors, and other inferior officers. The harbour has water enough for the largest ships, and room enough for 10,000 sail without being crowded. For its security, there is a fort at the mouth of the river on each side, and a bar that runs across it, and is very dangerous to pass without pilots. Higher up, at a place where the river is considerably contracted, there is a fort called Torre de Belem, or the Tower of Belem, under whose guns all ships must pass in their way to the city; and on the other side are several more forts. Before the earthquake, most of the private houses

were old and unsightly, with lattice windows; and the number of convents and colleges amounted to 50, namely, 32 for monks, and 18 for nuns. The principal palace stands on the river, and is large and commodious. Of the hospitals, that called the Great is obliged to receive all persons, of what degree, nation, or religion soever, without exception. In the centre of the city, upon one of the highest hills, is the castle, which commands the whole, being large and ancient, and having always a garrison of four regiments of foot. The cathedral is a vast edifice of the Gothic kind, but heavy and clumsy: it contains, however, great riches, and is finely adorned within. The square called Rossio is large, and surrounded with magnificent buildings. The whole city is under the ecclesiastical jurisdiction of the patriarch, who was appointed in the year 1717. Here is also an archbishop. The university, which was removed for some time to Coimbra, but afterwards restored to its ancient seat, makes a considerable figure, though much inferior to that of Coimbra.

LISBURN, a town of Ireland, in the county of Antrim and province of Ulster, 73 miles from Dublin. It was burnt down about 50 years ago, but is now rebuilt in a neat and handsome manner, and has a large linen manufactory. It is seated on the river Laggan, in long. 6. W. lat. 54. 41. It gives title of earl to the family of Vaughan; and it returned two members to parliament, one half of the patronage of this borough being in the earl of Hertford. Fairs held on the 21st of July and 5th of October.

LI'SIARTHUS. In botany, a genus of the class pentandria; order monogynia. Corol with a swelling tube, the segments recurved; calyx carinate; stigma two-lobed; capsule two-celled, oblong. Fifteen species—herbaceous plants of America and the West Indies.

LISLE, a strong city of France, in the department of the North, and late province of French Flanders, of which it was the capital. It is one of the richest and most commercial towns in France; and the inhabitants are computed to be 65,000. It is called Lisle (that is *L'Isle*, the Island) because it was formerly surrounded by marshes, which are now drained. Its citadel is supposed to be the finest in Europe, next to that of Turin. The streets, particularly those of the New Town, are adorned with noble buildings. The Great Square and the Little Square are both distinguished in this respect; and among the public structures are the exchange, a magazine of vast extent, and a general hospital very lately built. Here are manufactures of all sorts; but the principal trade is in camlets.—Lisle was taken by the allies, after three months siege, in 1708, but was restored by the treaty of Utrecht in 1713, in consideration of the demolition of the fortifications of Dunkirk. In 1792 it sustained a bombardment from the Austrians. It is seated on the Deule, 14 miles west of Tournay, and 130 north of Paris. Long. 3. 9. E. Lat. 50. 38. N.

LISLE (Claudius de), a learned historiographer, born at Vancouleurs, in 1644. He studied among the Jesuits at Pontamousson, took his degrees in law, and afterwards applied himself entirely to the study of history and geography; and to perfect himself in those sciences, went to Paris, where the principal lords of the court became his scholars, and among the rest the duke of Orleans, afterwards regent of the kingdom. He wrote, 1. An Historical Account of the Kingdom of Siam. 2. A Genealogical and Historical Atlas. 3. An Abridgement of Universal History. He died at Paris in 1720.

Lisle (William de), son of the former, and the most learned geographer France has produced, was born at Paris in 1675. He became first geographer to the king, royal censor, and member of the academy of sciences. He died iu 1726. He published a great number of excellent maps, and wrote many pieces in the Memoirs of the Academy of Sciences.

Lisle (Sir John), a brave loyalist in the time of the civil wars, was the son of a bookseller in London, and received his education in the Netherlands. He signalized himself upon many occasions in the civil war, particularly in the last battle of Newbury, where, in the dusk of the evening, he led his men to the charge in his shirt, that his person might be more conspicuous. The king, who was an eye-witness of his bravery, knighted him in the field of battle. In 1648 he rose for his majesty in Essex; and was one of the royalists who so obstinately defended Colchester, and who died for the defence of it. This brave man having tenderly embraced the corpse of Sir Charles Lucas, his departed friend, immediately presented himself to the soldiers who stood ready for his execution. Thinking that they stood at too great a distance, he desired them to come nearer: one of them said, "I warrant you, sir, we shall hit you!" He replied with a smile, "Friends, I have been nearer you when you have missed me." He was executed August 28, 1648.

Lisle (Joseph Nicolas de), a French astronomer, was born at Paris in 1688. He belonged to all the learned academies in Europe, and was the intimate friend of Newton and Halley. In 1726 he went to Russia by invitation, and remained there till 1747. His greatest work is entituled, Memoirs of the History of Astronomy. He died in 1768. To his other great qualities he added unaffected piety.

LISMORE, one of the western islands of Scotland, in a spacious bay, between Mull and the coast of Argyleshire. It is a fertile island, nine miles long and two broad, and was the residence of the bishops of Argyle,

LI'SME. *s.* A cavity; a hollow.

LISONZO, a river which rises in Carinthia, runs through part of the republic of Venice, and falls into the gulf of Venice, at the harbour of the same name.

*To* LISP. *v. a.* (hlyp, Saxon.) To speak with too frequent appulses of the tongue to the teeth or palate (*Cleaveland*).

LISP. *s.* The act of lisping (*Tatler*).

LI'SPER. *s.* (from *lisp.*) One who lisps.

LISSA, an island in the gulf of Venice, on the coast of Dalmatia, lately belonging to the Venetians. Here is a fishery of pilchards and anchovies, and it produces excellent wine. It is 70 miles west of Ragusa. Long. 17. 0. E. Lat. 42. 52. N.

Lissa, a town of Poland, in the palatinate of Posnia, 50 miles west of Kalisch. Long. 16. 50. E. Lat. 52. 0. N.

Lissa, a village of Silesia, six miles north west of Breslaw. It is seated on the Weistritz, and remarkable for a great victory gained by the Prussians over the Austrians, in 1757.

LISSUS, in ancient geography, a river of Thrace, falling into the Ægean sea, between Thasos and Samothracia. According to Herodotus, it was dried up by the army of Xerxes, when he invaded Greece.

LIST, *s.* (*liste*, French.) 1. A roll; a catalogue (*Prior*). 2. (*lice*, French.) Enclosed ground in which tilts are run, and combats fought (*Pope*). 3. Bound; limit (*Shakspeare*). 4. (lyftan, Saxon.) Desire; willingness (*Dryden*).

List, in commerce, the border of cloth or stuff; serving not only to show their quality, but to preserve them from being torn in the operations of fulling, dyeing, &c.—List is used on various occasions; but chiefly by gardeners, for securing their wall-trees.

List, in architecture, a little square moulding, otherwise called a *fillet*, *listel*, &c. See Architecture.

List is also used to signify the inclosed field or ground wherein the ancient knights held their justs and combats. It was so called, as being hemmed round with pales, barriers, or stakes, as with a list. Some of these were double, one for each cavalier; which kept them apart, so that they could not come nearer each other than a spear's length. See Just, Tournament, Duel, &c.

*To* List. *v. a.* (lyftan, Saxon.) To choose; to desire; to be disposed (*Whitgift*).

*To* List. *v. a.* (from the noun.) 1. To enlist; to enrol or register (*South*). 2. To retain and enrol soldiers (*Temple*). 3. To enclose for combats (*Dryden*). 4. To sew together, in such a sort as to make a particoloured show (*Wotton*). 5. (contracted from *listen.*) To hearken to; to listen; to attend (*Shakspeare*).

LI'STED. *a.* Striped; particoloured in long streaks (*Milton*).

*To* LI'STEN. *v. a.* To hear; to attend (*Sh.*)

*To* Li'sten. *v. a.* To hearken; to give attention (*Bacon*).

LI'STENER. *s.* (from *listen.*) One that hearkens; a hearkener (*Swift*).

LISTER (Dr. Martin), an eminent English physician and naturalist, was born in 1638, and educated at Cambridge. He afterwards travelled into France; and at his return practised physic at York, and afterwards at London. In 1683 he was created doctor of physic, and became fellow of the College of Physicians in London. In 1698 he attended the Earl of Portland in his embassy from King William III. to the court of France; of which journey he published an account at his return, and was afterwards physician to Queen Anne. He also published, 1. Historia animalium Angliæ, 4to. 2. Conchyliorum Synopsis, folio. 3. Cochlearum et Limachum Exercitatio Anatomica, 4 vols. 8vo. 4. Many pieces in the Philosophical Transactions; and other works.

LI'STING, or enlisting of soldiers. Persons listed are to be carried within four days, but not sooner than twenty-four hours, after they have enlisted, before the next justice of peace of any county, riding, city, or place, or chief magistrate of any city or town corporate (not being an officer in the army); and if, before such justice or magistrate they dissent from such listing, and return the listing money, and also twenty shillings in lieu of all charges expended on them, they are to be discharged. But such persons refusing or neglecting to return or pay such money within twenty-four hours, shall be deemed as duly listed as if they had assented thereto before the proper magistrate; and they will, in that case, be obliged to take the oath, or upon refusal they shall be confined by the officer who listed them till they do take it. Persons owning before the proper magistrate, that they voluntarily listed themselves, are obliged to take the oath, or suffer confinement by the officer who listed them till they do take it. The magistrate is obliged, in both cases, to certify that such persons are duly listed; setting forth their birth, age, and calling, if known; and that the second and sixth sections of the articles of war, against mutiny and desertion, were read to them, and that they had taken the oath. Officers offending herein are to be cashiered, and displaced from their office; to be disabled from holding any post, civil or military; and to forfeit 100l. Persons receiving enlisting money from any officer, knowing him to be such, and afterwards absconding, and refusing to go before a magistrate to declare their assent or dissent, are deemed to be inlisted to all intents and purposes, and may be proceeded against as if they had taken the oath.

LI'STLESSLY. *ad.* (from *listless.*) Without thought; without attention (*Locke*).

LI'STLESSNESS. *s.* (from *listless.*) Inattention; want of desire (*Taylor*).

LI'STLESS. *a.* (from *list.*) 1. Without inclination; without any determination to one more than another (*Tillotson*). 2. Careless; heedless (*Dryden*).

LIT. The preterit of *light* (*Addison*).

LITA. In botany, a genus of the class pentandria; order monogynia. Corol salver-shaped, with a very long tube; anthers sessile in the throat of the corol; stigma truncate; capsule one-celled, two-valved; seeds numerous. Two species—herbaceous plants of Guiana.

LITANY, a solemn form of supplication to God, in which the priest utters some things fit to be prayed for, and the people join in their intercession, saying, "We beseech thee to hear us, good Lord!" &c. The word comes from the Greek λιτανεια, "supplication;" of λιτανευω, "I beseech."

At first the use of litanies was not fixed to any stated time, but was only employed as exigencies required. They were observed, in imitation of the Ninevites, with ardent supplications and fastings, to avert the threatning judgments of fire, earthquakes, inundations, or hostile invasions. About the year 400, litanies began to be used in processions, the people walking barefoot, and repeating them with great devotion; and it is pretended, that by this means several countries were delivered from great calamities. The days on which these were used were called *rogation days:* these were appointed by the canons of different councils, till it was decreed by the council of Toledo, that they should be used every month throughout the year; and thus by degrees they came to be used weekly on Wednesdays and Fridays, the ancient stationary days for fasting. To these days the rubric of our church has added Sunday, as being the greatest day for assembling at divine service. Before the last review of the common prayer, the litany was a distinct service by itself, and used some time after the morning prayer was over; at present it is made one office with the morning service, being ordered to be read after the third collect for grace, instead of the intercessional prayers in the daily service.

LITCHFIELD. See LICHFIELD.

LI'TERAL. *a.* (*literal*, French.) 1. According to the primitive meaning, not figurative (*Hammond*). 2. Following the letter, or exact words (*Hooper*). 3. Consisting of letters.

LI'TERAL. *s.* Primitive or literal meaning (*Brown*).

LITERA'LITY. *s.* (from *literal.*) Original meaning (*Brown*).

LI'TERALLY. *ad.* (from *literal.*) 1. According to the primitive import of words; not figuratively (*Swift*). 2. With close adherence to words (*Dryden*).

LI'TERARY. *a.* (*literarius*, Latin.) Respecting letters; regarding learning.

LI'TERARY *Property.* Authors, it should seem had, by the common law, the sole and exclusive copyright remaining in themselves or their assigns in perpetuity, after having printed and published their compositions. This, as a common law right, was strangely questioned by some of our judges, who studied special pleading more than common sense. But by statute 8 Anne, c. 19, it is secured to them for fourteen years, from the day of publishing; and after the end of fourteen years, the sole right of printing or disposing of copies, shall return to the authors, if then living, for other fourteen years. This statute, it has been held, restrains the right of the author and his assigns to the fourteen or the twenty-eight years, whatever it might have been at the common law. A penalty on each sheet found in the possession of a party pirating a work, is inflicted by the statute, 9 Anne, c. 19; but in order to entitle the plaintiff to recover this penalty, the book must have been entered at Stationers' Hall. But an author whose work has been pirated, may maintain an action for damages merely without having so entered his book. When an author transfers all his right or interest in a publication to another, and happens to survive the first fourteen years, the second term will result to his assignee, and not to himself. By statute 12 Geo. II. c. 36. 34 Geo. III. c. 20, s. 57, books printed in England originally, may not be reprinted abroad, and imported within twenty years. And a late act, 41 Geo. III. c. 107, extends also to Ireland, where English books were frequently pirated. By statute 8 Geo. II. c. 13; 7 Geo. III. c. 28; 17 Geo. III. c. 57. Engravers have a property in their prints and engravings for twenty-eight years absolutely. A fair abridgment is equally protected with an original work. Acting a play on a stage is not a publishing within the statute, 8 Anne, c. 19; but one cannot take a piece in short-hand and print it before the author has published it.

LI'TERARY *Criticism.* See CRITICISM.

LI'TERATI, LETRADOS, lettered, an epithet given to such persons, among the Chinese, as are able to read and write their language.

The *literati* alone are capable of being made mandarins.

LI'TERATI is also the name of a particular sect, either in religion, philosophy, or politics; consisting principally of the learned men of that country: among whom it is called *jukiao*, i. e. *learned.*

It had its rise in the year of Christ, 1400, when the emperor, to awaken the native affection of the people for knowledge, which bad been quite banished by the preceding civil wars among them, and to stir up emulation among the mandarins, chose out forty-two of the ablest among their doctors, to whom he gave a commission to compose a body of doctrine, agreeable to that of the ancients, which was then become

the rule, or standard, of the learned. The delegates applied themselves to the business with very great attention; but some fancied them rather to have wrested the doctrine of the ancients, to make it consist with their's, than to have built up their's on the model of the ancients.

They speak of the Deity as if it were no more than mere nature, or the natural power or virtue that produces, disposes, and preserves the several parts of the universe. It is say they, a pure, perfect principle, without beginning or end; it is the source of all things, the essence of every being, and that which determines it to be what it is. They make God the soul of the world; they say, he is diffused thoughout all matter, and produces all the changes that happen there. In short, it is not easy to determine, whether they resolve God into nature, or lift up nature into God; for they ascribe to it many of those things which we attribute to God.

This doctrine, in lieu of the idolatry that prevailed before, introduced a refined kind of atheism.

LI'TERATURE. *s.* (*literatura*, Latin.) Learning; skill in letters (*Bacon. Addison*).

LI'THAGOGUES. (from λιθος, a stone; and αγω, to bring away.) Medicines which expel the stone from the bladder, or expedite the passage of gravel.

LITHA'RGE, an oxide of lead.

LITHA'RGYRUM. See Lead.

LITHA'RGYRUS. (*Lithargyrus*, *i*, m. λιθαργυρον, from λιθος, a stone, and αργυρον, silver.) White lead, the scum of silver. See Lead, and Oxydum plumbi semivitreum

LITHAY, a town of Germany, in the duchy of Carniola, situate on the Save, 15 miles east of Lansbach.

LI'THE. *a.* (liðe, Saxon.) Limber; flexible; pliant; easily bent (*Milton*).

LI'THENESS. *s.* Limberness; flexibility.

LI'THER. *a.* (from *lithe.*) 1. Soft; pliant (*Shakspeare*). 2. (lyðer, Saxon.) Bad; sorry; corrupt.

LI'THIATS. (*Lithias*, *tis*, m.) Salts formed by the union of the lithic acid, or acid of the stone sometimes found in the human bladder, and never in the bladder of any other animal, with different bases; thus, *lithiat of alumine*, *lithiat of ammoniac*, &c.

LI'THIC Acid. (from λιθος, a stone.) *Uric Acid.* A peculiar acid generated in human urine, and in the urine of no other animal whatever. It is the basis, in conjunction with calcareous matter, of the gravel and stone that often concrete in the pelvis of the kidneys and in the bladder; and of those calcareous concretions which are often formed in the joints during severe fits of the gout, and in the tendinous fasciæ of the muscles in severe rheumatisms: and hence its name. For its chemical characters and analysis, see Uric Acid, and Urinary Calculus.

LITHI'ASIS. (from λιθος, a stone.) The disease called stone or gravel. Also a hard, stone-like tumour on the eye-lid.

LITHOBO'LIA, a festival celebrated at Trœzene, in honour of Lamia and Auxesia, who came from Crete, and were sacrificed by the fury of the seditious populace, and stoned to death. Hence the name of the solemnity, λιθοβολια, *lapidation.*

LITHOGRAPHY. *s.* (λιθος and γραφω.) The art or practice of engraving upon stones.

LITHO'LOGY. (*Lithologia*, *æ*, f. λιθολογια, from λιθος, a stone, and λογος, a discourse.) A discourse or treatise on stones.

LITHOMANTIA, Λιθομαντεια, in antiquity, a species of divination performed with stones. Sometimes the stone called *siderites*, was used: this they washed in spring-water in the night by candle-light; the person that consulted it, was to be purified from all manner of pollution, and to have his face covered: this done, he repeated divers prayers, and placed certain characters in an appointed order; and then the stone moved of itself, and in a soft, gentle murmur (or as some say) in a voice like that of a child, returned an answer. By a stone of this nature, Helena is reported to have foretold the destruction of Troy.

LITHOMARGE, in mineralogy. See Argilla.

LITHONTRI'PTICS (*Lithontriptica*, sc. *medicamenta*, λιθοντριπτικα, from λιθος, a stone; and θρυπτω, to break.) From the strict sense and common acceptation of the word, this class of medicines should comprehend such as possess a power of dissolving calculi in the urinary passages. It is, however, a question, whether there be in nature any such material. By this term then, is meant those substances which possess a power of removing a disposition in the body to the formation of calculi. The different articles referred to this class are comprehended under two orders: 1. *Antacid lithontriptics*, as *lime-water* and *caustic alkali*, which are best suited to such constitutions as are disposed to acidity in the primæ viæ. 2. *Adstringent lithontriptics*, as *uva ursi*, &c. which are mostly selected for the relaxed fibre, but which may be given with obvious advantage where there are no manifest marks indicating laxity.

LITHO'PHILA. In botany, a genus of the class diandria; order monogynia. Calyx three-leaved; corol three-petalled; nectary two-leaved; pericarp two-petalled. One species only—a plant of no repute, and its native soil unknown.

LITHOPHYTES. In zoology, that division of zoophytes which has a hard calcareous stem.

LITHO'SPERMUM. Gromwell. In botany, a genus of the class pentandria; order monogynia. Corol funnel-form, with a peurious, naked throat; calyx five-parted. Sixteen species—scattered over the globe; of which three are common to the dry woods,

corn-fields, and mountains of our own country. The chief is L. officinale; with smooth seeds, corols hardly exceeding the calyx; leaves lanceolate, rather acute, veined. The seeds were formerly used as a lithagogue, or expeller of the stone in the bladder; and are sometimes still employed in the form of emulsions for obviating stranguary.

LITHOSTROTA, among the ancients, pavements made up of small pieces of cut marble of different kinds and colour. See TESSELATED.

LITHO'TOMIST. *s.* (λίθος and τέμνω.) A chirurgeon who extracts the stone by opening the bladder.

LITHO'TOMY. *s.* (λίθος and τέμνω.) The art or practice of cutting for the stone. See SURGERY.

LI'THUANIA, a large country of Europe, anciently governed by its grand dukes, but, in 1569, united to Poland, under one elective king. It is bounded on the south by Volhinia; on the west by Little Poland, Polachia, Prussia, and Samogitia; on the north by Livonia and Russia, which last bounds it on the east. It is 300 miles long and 250 broad. The principal rivers are, the Dnieper, Dwina, Nieman, Pripecz, and Bog. It is a flat country; and the soil is not only fertile in corn, but it produces honey, wood, pitch, and vast quantities of wool: here are also excellent little horses, which are never shod, their hoofs being very hard. There are vast forests, in which are bears, wolves, elks, wild oxen, lynxes, beavers, wild cats, &c. and eagles and vultures are very common. In the forests, large pieces of yellow amber are frequently dug up. The country swarms with Jews, who, though numerous in every other part of Poland, seem to have fixed their head-quarters in this duchy; and this, perhaps, is the only country in Europe where Jews cultivate the ground. The peasants are in the most abject vassalage. In 1772, Empress Catharine compelled the Poles to cede to her all that part of Lithuania bordering upon Russia, and including at least one-third of the country. This she erected into the two governments of Polotsk and Mohilef. In 1793, in conjunction with the king of Prussia, she effected another partition of Poland, in consequence of which she extended her dominion over almost the whole of Lithuania.

LI'TIGANT. *s.* (*litigans*, Latin.) One engaged in a suit of law (*L'Estrange*).

LI'TIGANT. *a.* Engaged in a juridical contest (*Ayliffe*).

*To* LI'TIGATE. *v. a.* (*litigo*, Latin.) To contest in law; to debate by judicial process.

*To* LI'TIGATE. *v. n.* To manage a suit; to carry on a cause (*Ayliffe*).

LITIGA'TION. *s.* (*litigatio*, Latin.) Judicial contest; suit of law (*Clarendon*).

LITI'GIOUS. *a.* (*litigieux*, French.) 1. Inclinable to lawsuits; quarrelsome; wrangling (*Donne*). 2. Disputable; controvertible (*Dryden*).

LITI'GIOUSLY. *ad.* Wranglingly.

LITI'GIOUSNESS. *s.* A wrangling disposition; inclination to vexatious suits.

LITMU'S, or ARCHIL. (*Orseille*, *Tournesol*, French.) A beautiful but penetrable dye, in the form of a red paste, prepared from a species of lichen, which grows abundantly in the Canary islands, in the south of France, and in several other parts. Many other species of lichen have also the property of assuming a beautiful purple, when prepared in the same manner as litmus. It is generally met with in commerce in the form of cakes, like anotta; and these cakes are prepared both in Holland and in London, in large quantities, for the use of the dyers.

The process employed in Holland has been long concealed as much as possible, but it is known to be effected by fermenting the moss, or lichen, and adding alkalies and urine. The following is said to be the process: The lichen is first dried, cleansed, and reduced to powder in a sort of oil-mill. The powder is next thrown into a trough with one half its weight of pearl-ash; and moistened with a little human urine, and allowed to ferment. This fermentation is kept up for some time by successive additions of urine, till the colour of the materials changes first to red, and then to blue. While in this state, it is mixed with a third of its weight of very good pot-ash, and spread upon deep wooden trays till it dries. A quantity of chalk is added at last, apparently with no other object than to increase the weight.

The colour of archil is readily extracted by water, or by alkohol. The colour of the watry solution, or of any substance dyed with it, soon fades by exposure to air; and hence it is used to give a gloss or finish to the deeper and more permanent colours. For this purpose it is much employed in the dyeing of silks, stuffs and ribbons.

All acids, and salts with excess of acids, changes the natural violet purple of litmus to red; and this change is effected so readily and perfectly with a very small quantity of acidity, as to render litmus a valuable test to the chemist to detect the presence of uncombined acids. Even the carbonic acid, in so small a proportion as that in which it exists in the breath (about five or six per cent. of the bulk of the air expired), may be made to change the colour of litmus infusion, if a little of it, diluted so that the purple-blue is scarcely visible, be shaken in a phial containing air expired from the lungs. It is probable too, on account of the carbonic acid from the atmosphere, that paper, or any thing else tinged with litmus, reddens before the colour is altogether lost. When reddened by an acid, the blue is restored by an alkali; and thus litmus may be made a test both of acid and alkali.

None of the known mordants appear to

have any effect in rendering the dye of archil less perishable, except perhaps the solution of tin; but this being always acid, also changes the colour, so that the fine purple-blue is equally lost. Marble soaked with litmus liquor imbibes it in some days, and becomes beautifully tinged, and the colour will remain for a considerable time unimpaired.

LITIZ, a town of the state of Pennsylvania. Here is a flourishing settlement of the Moravians, begun in 1757. It is eight miles from Lancaster, and 70 west of Philadelphia.

LITSCHAU, a town of Germany, in the archduchy of Austria, 70 miles north-west of Vienna. Long. 14. 55. E. Lat. 48. 48. N.

LITTER (*lectica*), a kind of vehicle borne upon shafts; anciently esteemed the most easy and genteel way of carriage. Du-Cange derives the word from the barbarous Latin *lecteria* "straw or bedding for beasts." Others will rather have it come from *lectus*, "bed;" there being ordinarily a quilt and a pillow to a litter, in the same manner as to a bed. Pliny calls the litter the *traveller's chamber*: it was much in use among the Romans, among whom it was borne by slaves kept for that purpose; as it still continues to be in the east, where it is called a *palanquin*. The Roman lectica, made to be borne by four men, was called *tetraphorum*; that borne by six, *hexaphorum*; and that borne by eight, *octaphorum*. The invention of litters, according to Cicero, was owing to the kings of Bithynia: in the time of Tiberius they were become very frequent at Rome, as appears from Seneca: and even slaves themselves were borne in them, though never by more than two persons, whereas men of quality had six or eight.

Litter also denotes a parcel of dry old straw put upon the floor of a horse's stall, for him to lie down and rest upon.

Litter denotes further—1. A brood of young (*L'Estrange*). 2. A birth of animals (*Dryden*). 3. Any number of things thrown sluttishly about (*Swift*).

*To* LI'TTER. *v. a.* (from the noun.) 1. To bring forth: used of beasts, or of human beings in contempt (*Brown*). 2. To cover with things negligently (*Swift*). 3. To cover with straw (*Dryden*). 4. To supply cattle with bedding.

LITTERE'LLA. Shore-weed. In botany, a genus of the class monôecia; order tetrandria, Male; calyx four-leaved; corol one-petalled, four-cleft; stigmas very long. Female: calyxless; corol one-petalled, unequally three-cleft; style filiform, very long; nut one-celled. One species only, a native of the sandy marshes, and shores of our own country.

LITTERMORE, an island near the west coast of Ireland, and county of Galway, about four miles long and two broad. Long. 9. 40, W. Lat. 55. 17 N.

LI'TTLE. *a.* comp. less; superlat. *least* (*leitels*, Gothick; lytel, Saxon.) 1. Small in extent (*Joshua*). 2. Not great; small; diminutive (*Locke*). 3. Of small dignity, power, or importance (*Samuel*). 4. Not much; not many (*Pope*). 5. Some, not none (*Locke*).

Li'ttle. *s.* 1. A small space (*Dryden*). 2. A small part; a small proportion (*Locke*). 3. A slight affair (*Prior*). 4. Not much (*Cheyne*).

Li'ttle. *ad.* 1. In a small degree (*Watts*). 2. In a small quantity (*Otway*). 3. In some degree, but not great (*Arbuthnot*). 4. Not much (*Swift*).

LI'TTLENESS. *s.* (from *little.*) 1. Smallness of bulk (*Burnet*). 2. Meanness; want of grandeur (*Addison*). 3. Want of dignity (*Collier*).

LITTLETON (Sir Thomas), judge of the Common Pleas, was the eldest son of Thomas Westcote, Esq. of the county of Devon, by Elizabeth, sole heiress of Thomas Littleton, of Frankley in Worcestershire, at whose request he took the name and arms of that family. He was educated at one of our universities, probably at Cambridge. Thence he removed to the Inner Temple, where he became one of the readers; and was afterwards, by Henry VI. made steward or judge of the court of the palace, or marshalsea of of the king's household. In 1455, the thirty-third of that reign, he was appointed king's serjeant, and rode the northern circuit as judge of assize. In 1462, the second of Edward IV. he obtained a pardon from the crown; and, in 1466, was appointed one of the judges of the Common Pleas, and rode the Northamptonshire circuit. In the year 1474 he was, with many of the first nobility, created knight of the bath. He died in 1481; and was buried in the cathedral church of Worcester, where a marble tomb, with his statue upon it, was erected to his memory. As to his character as a lawyer, it is sufficient to inform the reader, that he was the author of the Treatise upon Tenures, on which Sir Edward Coke wrote a comment, well known by the title of Coke upon Littleton.

Littleton (Adam), descended from an ancient family in Shropshire, was born in 1627, educated at Westminster School, and went to Oxford a student of Christ Church, whence he was ejected by the parliament visitors in 1648. Soon after, he became usher of Westminster School, and in 1658 was made second master. After the restoration he taught a school at Chelsea, in Middlesex, of which church he was admitted rector in the year 1664. In 1670 he accumulated the degrees in divinity, being then chaplain in ordinary to his majesty. In 1674 he became prebendary of Westminster, of which church he was afterwards sub-dean. Beside the well-known Latin and English Dictionary, he published several other works.

He died in 1694, and was interred at Chelsea. He was an universal scholar; and extremely charitable, humane, and easy of access.

LI'TTORAL. *a.* (*littoralis*, Latin.) Belonging to the shore.

LI'TURGY, denotes all the ceremonies in general belonging to divine service.

The word comes from the Greek λειτυργια, *service, public ministry*; formed of λειτος, *public*; and εργον, *work*.

In a more restrained signification, liturgy is used among the Romanists to signify the mass; and among us the common prayer.

All who have written on liturgies agree, that in the primitive days, divine service was extremely simple, only clogged with a very few ceremonies, and consisting of but a small number of prayers; but, by degrees, they increased the number of external ceremonies, and added new prayers, to make the office look more awful and venerable to the people. At length things were carried to such a pitch, that a regulation became necessary; and it was found proper to put the service, and the manner of performing it, into writing; and this was what they called a liturgy.

" Liturgies not being enjoined or forbidden in Scripture, must be judged of," says Dr. Paley, "by their expediency."

Now, a liturgy, " first, prevents (or may prevent) absurd or extravagant addresses to God.

" Second. It prevents the confusion of extempore prayer.

" Third. It supplies, in some measure, the imperfections of the deliverer.

" Joint prayer, which is the end of a congregation, without a liturgy, is nearly impossible.

" Our Saviour authorises a fixed form of prayer, by appointing the Lord's Prayer.

" The properties required in a liturgy are,

" First, That it be compendious.

" Brevity may be studied too much; for it is necessary that the attention, which slumbered in one part, may be recalled in another.

" Second, That it express just conceptions of the divine attributes:

" Because by it the popular notions of God are formed.

" Third, That it recite such wants as the congregation are likely to feel, and no other.

" Upon this principle our *state* prayers are too long.

" Fourthly, That it contain as few controverted propositions as possible." *Paley's Moral Philosophy*. book 5.

On the contrary side of the question, the principal argument is, that the frequent repetition of the *same* prayers, with scarcely any variation, has a natural tendency to produce carelessness in the worshippers; in consequence of which they may go over the liturgy while their hearts are far otherwise occupied, and thus exhibit "the form of religion without the power."

Liturgies have been different at different times, and in different countries. We have the liturgy of St. Chrysostom, that of St. Peter, of St. James, the liturgy of St. Basil, the Armenian liturgy, the liturgy of the Maronites, of the Cophtæ, the Roman liturgy, the Gallican liturgy, the English liturgy, the Ambrosian liturgy, the Spanish and African liturgies, &c.

In the more early ages of the church, every bishop had the power to form a liturgy for his own diocese; and if he kept to the analogy of faith and doctrine, all circumstances were left to his own discretion. Afterwards the practice was for the whole province to follow the metropolitan church, which also became the general rule of the church: and this Lindwood acknowledges to be the common law of the church; intimating, that the use of several services in the same province, which was the case in England, was not to be warranted but by long custom. The liturgy of the church of England was composed in the year 1547, and established in the second year of King Edward VI. stat. 2. and 3 Edw. VI. cap. 1.

In the fifth year of this king it was reviewed; because some things were contained in that liturgy which shewed a compliance with the superstition of those times, and some exceptions were taken against it by some learned men at home, and by Calvin abroad. Some alterations were made in it, which consisted in adding the general confession and absolution, and the communion to begin with the ten commandments. The use of oil in confirmation, and extreme unction were left out, and also prayers for souls departed, and what tended to a belief of Christ's real presence in the eucharist. This liturgy so reformed, was established by the act of 5 and 6 Edw. VI. cap. 1. However, it was abolished by Queen Mary, who enacted that the service should stand as it was most commonly used in the last year of the reign of King Henry VIII. The liturgy of 5 and 6 Edw. VI. was re-established with some few alterations and additions, by 1 Eliz. cap. 2. Some farther alterations were introduced, in consequence of the review of the Common Prayer Book, by order of King James, in the first year of his reign; particularly in the office of private baptism, in several rubricks and other passages, with the addition of five or six new prayers and thanksgivings, and all that part of the catechism which contains the doctrine of the sacraments. The book of Common Prayer, so altered, remained in force from the first year of King James, to the fourteenth of Charles II. But the last review of the liturgy, was in the year 1661, and the last act of uniformity enjoining the observance of it, is 13 and 14 Car. II. cap. 4. See Common *Prayer*. Many applications have been

since made for a review, but hitherto without success.

LITUUS, among the Romans, was the staff made use of by the augurs in quartering the heavens. It bore a great resemblance to the crosier of a bishop, but was shorter. It was crooked at one end, and thickest in the curved part, according to A. Gellius. We frequently met with a representation of it upon medals, amongst other pontifical instruments. It was called *Lituus Quirinalis*, from Quirinus, a name of Romulus, who was skilled in all the mysteries of augury.

Lituus was also an instrument of music in use in the Roman army. It was straight, excepting that it had a little bending at the upper end like a lituus, or sacred staff of the augurs; and from the similitude it derived its name. The lituus, as an instrument of martial music, was of a middle kind, betwixt the cornu and the tuba.

LIVADIA, a province of Turkey in Europe, bounded on the north by Janna, on the east by the Archipelago, on the south by the Morea, and on the west by the Mediterranean. It includes ancient Greece properly so called, and its capital is Setines, the once celebrated Athens.

Livadia, an ancient town of Turkey in Europe, in a province of the same name. It has a trade in wool, corn, and rice, and is 58 miles north-west of Athens. Long. 23. 26. E. Lat. 38. 40. N.

LIVADOSTA, a town of Livadia, seated on the gulf of Lepanto, in the isthmus of Corinth, to the north of the city of that name, with a bishop's see.

*To* LIVE. *v. a.* (lýpian, lýpigan, Saxon.) 1. To be in a state of animation; to be not dead (*Dryden*). 2. To pass life in any certain manner with regard to habits, good or ill, happiness or misery (*Hammond*). 3. To continue in life (*Shakspeare*). 4. To live emphatically; to be in a state of happiness (*Dryden*). 5. To be exempt from death, temporal or spiritual (*Thessalonians*). 6. To remain undestroyed (*Burnet*). 7. To continue; not to be lost (*Pope*). 8. To converse; to cohabit (*Shakspeare*). 9. To feed (*Arbuthnot*). 19. To maintain one's self (*Temple*). 11. To be in a state of motion or vegetation (*Dryden*). 12. To be unextinguished (*Dryden*).

LIVE. *a.* (from *alive.*) 1. Quick; not dead (*Exodus*). 2. Active; not extinguished (*Boyle*).

Live-*ever*, *Live-long*, in botany. See Sedum.

LI'VELESS. *a.* (from *live.*) Wanting life: rather, *lifeless* (*Shakspeare*).

LI'VELIHOOD. *s.* Support of life; maintenance; means of living (*Clarendon*).

LI'VELINESS. *s.* (from *lively.*) 1. Appearance of life (*Dryden*). 2. Vivacity; sprightliness (*Locke*).

LI'VELODE. *s.* Maintenance; support; livelihood (*Spenser*).

LI'VELONG. *a.* (*live* and *long.*) 1. Tedious; long in passing (*Shakspeare*). 2. Lasting; durable: not used (*Milton*).

LI'VELY. *a.* (*live* and *like.*) 1. Brisk; vigorous; vivacious (*Milton*). 2. Gay; airy (*Pope*). 3. Representing life (*Dryden*). 4. Strong; energetic (*Newton*).

LI'VELY, or LI'VELILY. *ad.* 1. Briskly; vigorously (*Hayward*). 2. With strong resemblance of life (*Dryden*).

LI'VER. *s.* (from *live.*) 1. One who lives (*Prior*). 2. One who lives in any particular manner (*Atterbury*).

LI'VER. (*Hepar*, ἧπαρ.) In anatomy, a large viscus of a deep red colour, of great size and weight, situated under the diaphragm, in the right hypochondrium, its smaller portion occupying part of the epigastric region. In the human body the liver is divided into two principal lobes, the right of which is by far the largest. They are separated on the upper side by a broad ligament, and on the lower side by a considerable depression or fossa. Between these two lobes is a smaller lobe, called *lobulus Spigelii*. In describing this viscus, it is necessary to attend to seven principal circumstances:—First, its ligaments. Second, its surfaces. Third, its margins. Fourth, its tubercles. Five, its fissure. Six, its sinus: and, Seven, the pori biliarii.

The ligaments of the liver are four in number, all arising from the peritoneum.

1. *The right lateral ligament*, which connects the thick right lobe with the posterior part of the diaphragm.

2. *The left lateral ligament*, which connects the convex surface and margin of the left lobe with the diaphragm, and in those of whom the liver is very large with the œsophagus and spleen.

3. *The broad or middle supensory ligament*, which passes from the diaphragm into the convex surface, and separates the right lobe of the liver from the left. It descends from above through the large fissure to the concave surface, and is then distributed over the whole liver.

4. *The round ligament*, which in adults consists of the umbilical vein indurated into a ligament. The liver has two surfaces, one superior, which is convex and smooth, and one inferior, which is concave, and has holes and depressions to receive not only the contiguous viscera, but the vessels running into the liver. The margins of the liver are also two in number; the one, which is posterior and superior, is obtuse; the other, situated anteriorly and inferiorly, is acute. The tubercles of the liver are likewise two in number, and are found near the vena portæ. Upon looking on the concave surface of this viscus a considerable fissure is obvious, known by the name of the fissure of the liver; but, in order to expose the sinus, it is necessary to remove the gall-bladder, when a considerable sinus, before occupied by the gall-bladder, will be apparent. The blood-

vessels of the liver are the hepatic artery, the vena portæ, and the cavæ hepaticæ, which are described under their proper names. The absorbents of the liver are very numerous. The liver has nerves from the great intercostal and eighth pair, which arise from the hepatic plexus, and proceed along with the hepatic artery and vena portæ into the substance of the liver. With regard to the substance of the liver, various opinions have been entertained. It is, however, now pretty well ascertained to be a large gland, composed of smaller glands connected together by cellular structure. The small glands which thus compose the substance of the liver are termed penicilli, from the arrangement of the arterial ramifications of the vena portæ composing each gland, resembling that of the hairs of a pencil. The chief use of this large viscus is to supply a fluid, named bile, to the intestines, which is of great importance in chylification. The small penicilli perform this function by a specific action on the blood they contain, by which they secrete in their very minute ends the fluid termed *hepatic bile*; but whether they pour it into what is called a follicle, or not, is yet undecided, and is the cause of the difference of opinion respecting the substance of the liver. If it be secreted into a follicle, the substance is truly glandular, according to the notions of the older anatomists; but if it be secreted merely into a small vessel, called a biliary pore (whose existence can be demonstrated), corresponding to the end of each penicilli, without any intervening follicle, its substance is then, in their opinion, vascular. According to our notions in the present day, in either case, the liver is said to be glandular; for we connect to our senses the idea a gland, when any arrangement of the vessels performs the office of separating from the blood a fluid or substance different in its nature from the blood. The small vessels which receive the bile secreted by the penicilli, are called *pori biliarii*; these progressively converge throughout the substance of the liver towards its under surface, and at length form one trunk, called *ductus hepaticus*, which conveys the bile into either the *ductus communis choledochus*, or *ductus cysticus*. See Gall-bladder.

On examining the substance of the human liver chemically, Fourcroy found that alkali dissolved a part of it, and formed with it a soap: that alcohol also dissolved a part of it, which, on the addition of water, deposited a white flaky substance. This substance deprived of a small portion that was soluble in water, was of a yellowish colour, soft and greasy to the touch, like a concrete oil; water melted it under boiling heat, but did not take away its colour. It had then a slight odour like melted wax. On being cast into a porcelain cup, it becomes fixed into a solid brittle cake, of a polished surface, and snapped on breaking. Its internal texture was lamellated and manifestly crystallised. Heated alcohol completely dissolved it, and it presented all the properties of spermaceti, with this only difference, that it was not so dry, white, and transparent, but more soluble in alcohol than spermaceti. This appeared to be in a state of soap in the liver, for water likewise extracted it by means of heat, and the oil was afterwards rendered concrete on cooling, but the smallness of the quantity of liver prevented this chemist from making any further experiments.

Vanquelin, in like manner extracted an oil from the liver of the skate which became white as fat, and likewise as thick; and very similar to wax that had been kept warm between the fingers for some time.

Perhaps these are only instances of the partial conversion of animal matters into Adipocire, which see.

Li'ver *of Antimony*. See Stibium.

Li'ver *of Arsenic*. See Arsenicum.

Li'ver *of Sulphur*. See Sulphur.

Li'ver-*wort*, in botany. See Anemone.

Li'ver-*wort*, *ashcoloured*, or, *ground*, or *Iceland*. See Lichen.

Li'ver-*wort*, marsh. See Riecia.

LI'VERCOLOUR. *a.* (*liver* and *colour.*) Dark red (*Woodward*).

LI'VERGROWN. *a.* (*liver* and *grown.*) Having a great liver (*Graunt*).

LIVERDUN, a town of France, in the department of Meurthe, seated on a mountain, near the river Moselle eight miles north east of Toul. Long. 6. 5. E.—Lat. 48. 45. N.

LIVERPOOL, a large, flourishing, and populous town of England, in the county of Lancaster, situated at the influx of the river Mersey into the sea, 18 miles west of Warrington, and 203 north-west of London. Long. 2. 54. W. Lat. 53. 23. N. This town has so much increased in trade since the commencement of the last century, that it is now the greatest sea-port in England except London, having exceeded Bristol considerably of late years. The merchants trade to all parts of the world except Turkey, and the East Indies; but the most beneficial trade is to Guinea and the West Indies, by which many of them have acquired very large fortunes.

Liverpool, during the last war carried on more foreign trade than any town in England; and such is the state of it at this time, that there are more than three thousand vessels cleared from that port in one year to different parts of the world. Here are several manufactories for China-ware, and pot-houses which make very fine ware, some salt-works, glass-houses, and upwards of 50 breweries, from some of which large quantities of malt liquor are sent abroad. Many of the buildings are formed in the most elegant manner; but the old streets are narrow; a defect which will soon be removed, as the corporation have lately obtained an act of parliament for the improvement of the town,

which they immediately began to put in force with great spirit, having taken down the principal streets in the centre of the town, and rebuilt them in a spacious and most magnificent manner; so that in a few years it will probably be the handsomest town in England. This town contains ten churches, namely, St. Peter's, St. Nicholas's, St. George's, St. Thomas's, St. Paul's, St. Ann's, St. John's, St. James's, St. Catharine's, and St. Mary's. There are also meetings for independents, baptists, quakers, methodists, presbyterians, &c. The exchange is a noble structure, built of white stone in the form of a square, and round it are piazzas where the merchants assemble to transact business. Above it are the mayor's offices, the sessions-hall, the council-chamber, warehouses, and two elegant ball rooms. The expence of erecting this building amounted to 30,000l. The custom house is situated at the head of the old dock, and is a handsome and convenient structure. Here are many charitable foundations, among which is a lunatic hospital; a public dispensary; a school of instruction for blind persons, who are taught to manufacture various useful articles; an excellent grammar-school well endowed; and an infirmary in a very pleasant airy situation.

In the town is a charity-school supported by voluntary subscriptions and contributions for 50 boys and 12 girls, who are not only clothed and educated, but also provided with food and lodging: likewise several alms-houses for the widows of seamen: and an excellent poor-house, superior to any in the kingdom, where upwards of 800 men, women, and children, are supported, many of whom are employed in spinning cotton and wool. There are several large wet docks, dry docks, and graving docks for the repairing of shipping; which renders it the most commodious sea-port in the world. The quays which bound these docks are covered with warehouses; which is a convenience that enables the merchant to discharge his ship at a very small expence. The new prison lately finished is a noble edifice.

Liverpool received its charter from king John: it is under the government of a recorder, mayor, and an unlimited number of aldermen, two bailiffs, and a common-council of forty of the principal inhabitants, with a town-clerk and other proper officers. The town has a weekly market on Saturday, and is distant from London 204 miles. The progressive rise of population has been, and continues to be, prodigious. In 1565, there were only 138 house-holders and cottagers. In 1790 they were estimated at 60000.

In 1800 the houses amounted to 11780, the inhabitants to 77653. At present they amount to more than 100,000!

By the late inland navigation, Liverpool has communication with the rivers Dee, Ribble, Ouse, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Westmoreland, Chester, Stafford, Warwick, Leicester, Oxford, Worcester, &c. The Mersey, upon which the town is situated, abounds with salmon, cod, flounders, turbot, plaise, and smelts; and at full sea it is above two miles over. In the neighbourhood are frequent horse-races, on a five-mile course, the finest for the length in England. The soil in and near the town is dry and sandy, and particularly favourable to the growth of potatoes, on which the farmers often depend more than on wheat or any other grain. Fresh water is brought into the town by pipes, from some springs four miles off, pursuant to an act of parliament in the reign of Queen Anne. Liverpool sends two members to parliament.

LI'VERY. *s.* (from *livrer*, French.) 1. The act of giving or taking possession (*Shakspeare*). 2. Release from wardship (*King Charles*). 3. The writ by which possession is obtained. 4. The state of being kept at a certain rate (*Spenser*). 5. The clothes given to servants (*Pope*). 6. A particular dress; a garb worn as a token or consequence of any thing (*Sidney*).

LI'VERYMAN. *s.* (*livery* and *man.*) 1. One who wears a livery; a servant of an inferior kind (*Arbuthnot*).

LIVERYMEN of London, are a number of men chosen from among the freemen of each company. Out of this body the common-council, sheriffs, and other superior officers for the government of the city, are elected; and they alone have the privilege of giving their votes for members of parliament, from which the rest of the citizens are excluded.

LIVES. The plural of *life*.

LIVIA Drusilla, a celebrated Roman lady, daughter of L. Drussus Calidianus. She married Tiberius Claudius Nero, by whom she had the emperor Tiberius and Drusus Germanicus. Her husband had attached himself to the cause of Anthony, and Augustus saw her as she fled from the danger which threatened him, and he resolved to marry her, though then pregnant. This was the origin of her greatness. He divorced his wife Scribonia, and, with the approbation of the augurs, he celebrated his nuptials with Livia. She took advantage of the passion of Augustus, and caused her children by Drusus to be adopted by the emperor. Her cruelty and ingratitude are strongly marked, when she is charged with having murdered the parents of Augustus, her own husband, to hasten the elevation of Tiberius. Livia died in the 86th year of her age, A. D. 20. Tiberius shewed himself undutiful, both before and after her death, as he expressively commanded, that no honours, either private or public, should be paid to her memory.

LI'VID. *a.* (*livide*, French.) Discoloured, as with a blow; black and blue (*Bacon*).

LIVI'DITY. *s.* (*lividité*, French.) Discoloration, as by a blow (*Arbuthnot*).

LI'VING. *participle adj.* 1. Vigorous; active. 2. Being in motion.

Li'ving. *s.* (from *live.*) 1. Support; maintenance; fortune on which one lives (*Sidney*). 2. Power of continuing life (*L'Estrange*). 3. Livelihood (*Dryden*). 4. Benefice of a clergyman (*Spenser*).

LI'VINGLY. *ad.* (from *living.*) In the living state (*Brown*).

LIVIUS Andronicus, a dramatic poet, who flourished at Rome about 240 years B. C. He was the first who turned the personal satires and fescennine verses into the form of a proper dialogue and regular play. Andronicus was the freedman of M. Livius Salinator, whose children he educated. His poetry was grown obsolete in the age of Cicero. Some few of his verses are preserved in the *Corpus Poetarum.*

Li'vius, M. Salinator, a Roman consul, sent against the Illyrians, over whom he obtained signal advantages. He also obtained a splendid victory over Asdrubal a few years afterwards, who was passing into Italy with a reinforcement for his brother Annibal.

Livius (Titus), an illustrious historian, was born Patavium, or Padua, of an ancient family. He resided at Rome for many years, in the time of Augustus, to whom he used to read his history as he composed it. That emperor appointed him to superintend the education of his grandson Claudius. On the death of his patron he returned to his native place, where he died A. D. 17, in the 67th year of his age. According to some accounts Ovid died on the same day. The name of Livy is rendered immortal by his history of the Roman empire. Besides this he wrote some philosophical treatises and dialogues, with a letter addressed to his son, on the merit of authors, which ought to be read by young men. His Roman history was comprehended in 140 books of which only 35 are extant. It began with the foundation of Rome, and was continued till the death of Drusus in Germany. His stile is clear and indefatigable, laboured without affectation, diffusive without weakness, and argumentative without pedantry. But what distinguished Livy above all other historians, were his great probity, candour, and impartiality.

Scarce any man was ever more honoured, alive as well as dead, than this historian. Pliny the younger relates, that a native gentleman travelled from Gades, in the extremest parts of Spain, to see Livy: and, though Rome abounded with more stupendous and curious spectacles than any city in the world, yet he immediately returned, as if, after having seen Livy, nothing farther could be worthy of his notice. A monument was erected to this historian in the temple of Juno, where was afterwards founded the monastery of St. Justina. There, in 1413, was discovered the following epitaph upon Livy: *Ossa Titi Livii Patavini, omnium mortalium judicio digni, cujus prope invicto calamo invicti populi Romani res gestæ conscriberentur;* that is, "The bones of Titus Livius of Patavium, a man worthy to be approved by all mankind, by whose almost invincible pen the acts and exploits of the invincible Romans were written." These bones are said to be preserved with high reverence to this day, and are shewn by the Paduans as the most precious remains. In 1451, Alphonsus king of Arragon, sent his ambassador, Anthony Panormita, to desire of the citizens of Padua the bone of that arm with which this their famous countryman had written his history: and, obtaining it, caused it to be conveyed to Naples with the greatest ceremony as a most valuable relic. He is said to have recovered from an ill state of health by the pleasure he found in reading this history: and therefore, out of gratitude, put upon doing extraordinary honours to the memory of the writer.

Our author's history has been often published with and without the supplement of Freinshemius. The best editions are, that of Gronovius, *cum notis variorum et suis,* Lugd. Bat. 1679, 3 vol. 8vo; that of Le Clerc, at Amsterdam, 1709, 10 vol. 12mo; and that of Crevier, at Paris, 1735, 6 vol. 4to. These have the supplements. Drahenberch's Amsterdam edition, in 7 vols. 4to, 1738, is a very excellent one; but the notes are prolix. Rudiman's duodecimo edition, at Edinburgh in 1751, is very accurate. Homer's 8vo. edition, in 8 vols, 1794; and the Oxford edition of 1800, in 6 vols. 8vo.; both from Drakenborch, are valuable, they both have good indexes. Livy was translated into English by Mr. Baker, in 6 vols. 8vo.

Learning perhaps never sustained a greater loss, in any single author, than by the destruction of the latter and more interesting part of Livy. Several eminent moderns have indulged the pleasing expectation that the entire work of this noble historian might yet be recovered. It has been said to exist in an Arabic version: and even a complete copy of the original is supposed to have been extant as late as the year 1631, and to have perished at that time in the plunder of Magdeburg. The munificent patron of learning, Leo X. exerted the most generous zeal to rescue from oblivion the valuable treasure, which one of his most bigoted predecessors, above mentioned, had expelled from every Christian library. Bayle has preserved under the article Leo, two curious original letters of that pontiff, concerning his hopes of recovering Livy; which afford most honourable proofs of his liberality in the cause of letters.—A lately discovered fragment of Livy's history was published in 1773 by Dr. Bruns.

LIVONIA, a large province of the Russian empire, with the title of a duchy. It is bounded on the north by the gulph of Finland, on the west by that of Riga, on the south by Courland, and on the east, partly by Plescow, and partly by Novogorod. It is about 250 miles from north to south, and 150 from east to west. The land is so fertile in corn, that it is called the *granary of the north*; and would produce a great deal more, if it were not so full of lakes.

LIVRE, a French money of account containing 20 sols, and equal nearly in value to 10 pence of our money. See MONEY.

LIXI'VIA VITRIOLATA SULPHUREA. *Sal polychrestus.* Its virtues are delivered under the head of KALI *vitriolatum.*

LIXI'VIAL. *a.* (from *lixivium*, Latin.) 1. Impregnated with salts like a lixivium. 2. Obtained by lixivium (*Boyle*).

LIXI'VIATE. *a.* (from *lixivium*, Latin.) Making a lixivium (*Brown*).

LIXI'VIATION. *Lessive.* The process employed by chemists of dissolving by means of warm water, the saline and soluble particles of cinders, the residues of distillation and combustion, coals and neutral earths, in order to obtain those particles which are termed lixivial salts.

LIXI'VIUM, (*Lixivium, i,* n. from *lix*, wood-ash). The liquor in which saline and soluble particles of the residues of distillation and combustion are dissolved.

LIXI'VIUM *saponarium.* See AQUA *kali.*

LIXI'VIUM *tartari.* See AQUA *kali.*

LIZARD, in amphibiology. See LACERTA.

LIZARD, in geography, a cape or promontory of Cornwall, the most southern of England, whence ships usually take their departure when bound westward. According to the Requisite Tables, the Lizard is in Long. 5. 15. W. Lat. 49. 57½ N.

LIZARD'S-TAIL. In botany see Saurusus. Also a name for one or two species of the genus PIPER; which see.

LLANBEDER, a town in Cardiganshire, with a market on Tuesday. It is seated on the Tyvy, over which is a bridge into Carmarthenshire, 24 miles east of Cardigan, and 197 west by north of London. Long. 4. 8. W. Lat. 52. 9. N.

LLANDILOVAWR, a town in Carmarthenshire, with a market on Tuesday and Saturday. It is seated on an ascent, on the river Towy, over which is a bridge, 13 miles east by north of Carmarthen, and 194 west by north of London. Long. 3. 58. W. Lat. 51. 55. N.

LLANELLY, a town in Carmarthenshire, with a market on Tuesday. It trades much in coal, and is seated on a creek of the Bristol Channel, 13 miles south by east of Carmarthen, and 216 west by north of London. Long. 4. 10. W. Lat. 51. N.

LLANGADOC, a town in Carmarthenshire, with a market on Thursday. It is seated between the rivers Brane and Sawthy, which soon join the Towy, 18 miles east by north of Carmarthen, and 185 west by north of London. Long. 3. 48 W. Lat. 51. 54. N.

LLANTRISSENT, a town of South Wales, in the county of Glamorgan, with a weekly market on Friday. It is joined with Cardiff and other towns to send one member to the British parliament: 39 miles west-south-west of Monmouth, and 166 west of London.

LLANVELLING, a town of North Wales, in the county of Montgomery, with a weekly market on Saturday: 10 miles north-west of Welsh Pool, and 179 north-west of London.

L.L.D. An abbreviation of *legum doctor*, a doctor of both civil and canon laws.

LLOYD (William), a learned English bishop, was born at Tilehurst, in Berkshire, in 1627, and entered in 1638, at Oriel college, Oxford, from whence he removed to Jesus college, where he took his bachelor's degree in 1642. He afterwards became fellow, and in 1648, was episcopally ordained. At the restoration he became king's chaplain, and in 1676 obtained the living of St. Martin-in-the-fields. In 1680 he was raised to the see of St. Asaph; and in 1688 he was sent to the tower with six of his brethren, for petitioning against the royal declaration for liberty of conscience. He concurred heartily with the revolution, and in 1692 was translated to the see of Litchfield and Coventry, from whence, in 1699, he was removed to Worcester. He died in 1717. He wrote several tracts against popery, sermons, and a System of Chronology.

LLOYD (Robert), an English poet, was the son of Dr. Pierson Lloyd, second master of Westminster school, where Robert received his education, and was then admitted of Trinity college, Cambridge, and took his degree of M.A. He was employed for some time as usher to Westminster school, and while in that situation, wrote his poem called the Actor, published in 1760, the poetical merit of which was such, that when the Rosciad appeared, he was considered for a time as the author. His irregularities obliged him to quit his situation in Westminster school, and he almost wholly subsisted by the liberality of his friend Churchill. At length he sunk into a state of melancholy, and died in 1764. A collection of his poems was published by Dr. Kenrick, in 2 vols. 8vo. 1774. He was also the author of the Capricious Lover, a comic opera, 8vo. 1764, and other dramatic works.

LO, *interj.* (la, Sax.) Look; see; behold (*Shaks.*)

LOACH, in Ichthyology. See COBITIS.

LOAD. *s.* (hlade, Saxon.) 1. A burden; a freight; lading (*Dryden*). 2. Weight; pressure; encumberance (*Pope*). 3. Weight, or violence of blows (*Dryden*). 4. Any thing that depresses (*Ray*). 5. As much drink as one can bear (*L'Estr.*)

*To* LOAD. *v. a.* (hladan, Saxon.) 1. To

burden; to freight (*Shakspeare*). 2. To encumber; to embarrass (*Locke*). 3. To charge a gun (*Wiseman*). 4. To make heavy by something appended or annexed (*Addison*).

LOAD. *s.* (anciently and more properly *lode*; from laðu, Saxon to lead.) In mining, a word used, especially in the tin-mines, for any regular vein or course, whether metallic or not; but most commonly load means a metallic vein. It is to be observed, that mines in general are veins within the earth, whose sides receding from or approaching to each other, make them of unequal breadths in different places, sometimes forming large spaces, which are called holes; these holes are filled like the rest with substances, which, whether metallic, or of any other nature, are called loads. When the substances forming these loads are reducible to metal, the loads are by the English miners said to be alive, otherwise they are termed dead loads.

The load is frequently intercepted by the crossing of a vein of earth or stone, or some other metalline substance; in which case it generally happens, that one part of the load is moved to a considerable distance on one side. This load is by the miners termed a flooking, and the part of the load which is moved, is by them said to be heaved. This fracture or heave of a load, according to Mr. Price, is produced by a subsidence of the strata from their primary positions, which he supposes to have been horizontal or parallel to the surface of the earth, and therefore should more properly be called a depression than a heave. This heaving of the load would be an inexpressible loss to the miner, did not experience teach him that as the loads always run on the sides of the hills, so the part heaved is always moved toward the descent of the hill; so that the miner, working toward the ascent of the hill, and meeting a flooking, considers himself as working in the heaved part; wherefore, cutting through the flooking, he works upon its back up the ascent of the hill, till he recovers the load, and vice versa.

LO'ADER. *s.* (from *load.*) He who loads.

LOA'DSMAN. *s.* (*load* or *lode* and *man.*) He who leads the way; a pilot.

LO'ADSTAR. *s.* more properly *lodestar*, from læðan, Saxon, to lead.) The polestar; the cynosure; the leading or guiding star (*Spenser*).

LO'ADSTONE. *s.* (properly *lodestone*, or *leading-stone.*) The magnet; the stone on which the mariners compass needle is touched to give it a direction north and south. See FERRUM and MAGNET.

LOAF. *s.* (from hlaf, Saxon.) 1. A mass of bread as it is formed by the baker: a loaf is thicker than a cake (*Haywood*). 2. Any thick mass into which a body is wrought (*Mortimer*).

LOAM, in mineralogy, is a sub-species of the clay genus, and of a yellowish grey colour, frequently spotted yellow and brown. It occurs massive, is dull and sometimes weakly glimmering. It adheres pretty strongly to the tongue, feels greasy, and is not very heavy: it is generally mixed with sand and gravel, and also iron ochre. According to Mr. Jameson, it may be considered as sandy potter's clay, mixed with mica and iron ochre.

*To* LOAM. *v. a.* (from the noun.) To smear with loam, marl, or clay; to clay (*Moxon*).

LO'AMY. *a.* (from *loam.*) Marly (*Bacon*).

LOAN. *s.* (hlæn, Saxon.) Any thing lent; any thing given to another, on condition of return or repayment (*Bacon*).

LOANS, in political economy, sums of money, generally of large amount, borrowed from individuals or public bodies, for the service of the state. They are either compulsory, in which case they may be more properly termed requisitions; or voluntary, which is the only mode that can be frequently resorted to with advantage. Loans are sometimes furnished by public companies as a consideration for peculiar privileges secured to them; but are much more commonly advanced by individuals on a certain interest being allowed for the use of the money, either for a term of years, or until the principal shall be repaid.

The practice of borrowing money, for defraying part of the extraordinary expences in time of war, had been adopted in other countries long before it was introduced into Great Britain; but it has been carried to a far greater extent here than by any other state: and the facility with which the government has been enabled to raise the largest sums, has arisen entirely from the strict punctuality with which it has constantly made good all pecuniary engagements. The chancellor of the exchequer is the officer who usually conducts negociations of this kind on the part of the government, and the agreement is afterward confirmed by parliament; the governor and company of the Bank of England have of late years been usually appointed receivers of the contributions, for which they have an allowance, at a certain rate per million: and the sums received by them are paid into the exchequer in the name of the chief cashier of the Bank. The money appropriated to pay the interest of annuities, is issued at the receipt of the exchequer to the chief cashier of the Bank upon account, and he is enjoined to pay the annuities, and render his account in due course. The Bank detain their allowance for receiving the contributions out of the sum received, and likewise what they have allowed as discount to those subscribers who advanced their money before the times fixed for the several instalments.

When the parliament has voted the supplies, and the extent of the loan found necessary is determined, a communication is usually made to the Bank or Stock Exchange,

stating the particular stock on which the loan is to be made, and fixing a day for those who intend to bid for it, to wait on the minister with their proposals; in the mean time each person forms his list of friends who are to take different proportions with him in case he succeeds. When the day comes, each party offers as low as he thinks he can venture with a fair prospect of profit, and the lowest offer is generally accepted. The only step to be taken by those who are not of the number just mentioned, and who may wish to take a share in the transaction, is to apply to one of the subscribers for a part of his subscription, which at first may sometimes be had without any premium, or for a very small one, for it cannot be presumed that any small number of men, who have subscribed for the whole sum to be raised, intend, or can keep it, but that they propose to include in their subscriptions a great number of their connections and acquaintance. Sometimes the subscription lies open to the public at the Bank, as in the instance of the loan of eighteen millions for the service of the year 1797, and then every person is at liberty to subscribe what he thinks proper; and if upon casting up the whole, there is a surplus subscribed, which has generally been the case, the sum each person has subscribed is reduced in an equal proportion, so as to make in the whole the sum fixed by parliament.

As soon as conveniently may be, after the subscription is closed, receipts are made out and delivered to the subscribers, for the several sums by them subscribed; and for the conveniency of sale, every subscriber of a considerable sum has sundry receipts for different proportions of his whole sum, by which means he can readily part with what sum he thinks proper; and a form of assignment is drawn upon the back of the receipt, which being signed and witnessed, transfers the property to any purchaser. The deposit is generally ten per cent. and is made at or about the time of subscribing; the second payment is about a month after, and so on till the whole is paid in, each instalment being usually either ten or fifteen per cent. Those subscribers who choose to pay the whole sum before the appointed days of payment, are allowed discount at an agreed rate per cent. on the sum paid in advance, from the time of such payment to the period when the whole is required to be paid in by instalments. Those who do not complete the payment of the sum they have subscribed for, forfeit the part they have paid; and this is the case according to the acts of parliament, if the money is not paid by the days appointed; but payments are sometimes received after the appointed days on paying certain fees to the clerk.

Loans are usually raised upon either redeemable or irredeemable annuities. The former are those which, according to the conditions of the acts by which they are created, government may redeem without the consent of the proprietors, by discharging the debt at par; the latter are such as being granted for specific terms, cannot be redeemed without the consent of the proprietors. The various debts that have been incurred at different periods by loans on either of these species of annuities, constitute the funded debt of the nation; that is, the debt which has been secured upon certain funds created by parliament, and appropriated to the payment of the annual interest on the sums borrowed. The constant hope of being able at a future period to redeem the debts contracted, has induced the government generally to prefer raising money on annuities redeemable at par; and the disadvantage which might arise to the stockholder from being paid off at par, if his principal bore a high rate of interest, has always made those who advance money on loans prefer a large capital bearing a low rate per cent. though it may actually produce a somewhat less annual interest than would have been given on a capital equal to the sum advanced: the great speculations which are carried on in the public funds are also a strong inducement to prefer advancing money on these conditions, which have contributed so much to increase the nominal magnitude of the national debt.

During the reign of Queen Anne, loans were chiefly raised on annuities for 99 years, till 1711; when, by the establishment of the South Sea Company, a variety of debts were consolidated and made a permanent capital, bearing 6 per cent. interest. About this period lotteries were also frequently adopted for raising money for the public service, under which form a considerable premium was given, in addition to a high rate of interest. This mode of raising money was followed in 1712, 1713, and 1714. In the latter year, though the interest paid was equal to only 5l. 7s. 2d. per cent. on the sum borrowed, the premium allowed was upwards of 34l. per cent.; but, as peace was restored, and the legal rate of interest had been reduced to 5 per cent. it seems that a larger premium was allowed, for the sake of appearing to borrow at a moderate rate of interest.

In the reign of George I. the interest on a considerable part of the public debts was reduced to 5 per cent. and the few loans that were raised were, comparatively, of small amount; that of the year 1720, was obtained at little more than 4 per cent. interest.

About 1730 the current rate of interest was 3½ per cent.; and, in 1736, government was enabled to borrow at 3 per cent. per annum. The extraordinary sums necessary for defraying the expenses of the war, which began in 1739, were at first obtained from the sinking fund and the salt duties; a payment from the Bank, in 1742,

rendered only a small loan necessary in that year, which was obtained at little more than 3 per cent. interest. In the succeeding years the following sums were raised by loans, according to the accounts collected by the late Mr. G. G. Grellier.

| Year. | Sum borrowed. £ | Interest. £ | s. | d. |
|---|---|---|---|---|
| 1743 | 1,800,000 | 3 | 8 | 4 |
| 1744 | 1,800,000 | 3 | 6 | 10 |
| 1745 | 2,000,000 | 4 | 0 | 7 |
| 1746 | 2,500,000 | 5 | 5 | 1 |
| 1747 | 4,000,000 | 4 | 8 | 0 |
| 1748 | 6,300,000 | 4 | 8 | 0 |
| **LOANS OF THE SEVEN YEARS' WAR.** | | | | |
| 1756 | 2,000,000 | 3 | 12 | 0 |
| 1757 | 3,000,000 | 3 | 14 | 3 |
| 1758 | 5,000,000 | 3 | 6 | 5 |
| 1759 | 6,600,000 | 3 | 10 | 9 |
| 1760 | 8,000,000 | 3 | 13 | 7 |
| 1761 | 12,000,000 | 4 | 1 | 11 |
| 1762 | 12,000,000 | 4 | 10 | 9 |
| 1763 | 3,500,000 | 4 | 4 | 2 |
| **LOANS OF THE AMERICAN WAR.** | | | | |
| 1776 | 2,000,000 | 3 | 9 | 8 |
| 1777 | 5,000,000 | 4 | 5 | 2 |
| 1778 | 6,000,000 | 4 | 18 | 7 |
| 1779 | 7,000,000 | 5 | 18 | 10 |
| 1780 | 12,000,000 | 5 | 16 | 8 |
| 1781 | 12,000,000 | 5 | 11 | 1 |
| 1782 | 13,500,000 | 5 | 18 | 1 |
| 1783 | 12,000,000 | 4 | 13 | 9 |
| 1784 | 6,000,000 | 5 | 6 | 11 |
| **LOANS OF THE WAR WITH THE FRENCH REPUBLIC.** | | | | |
| 1793 | 4,500,000 | 4 | 3 | 4 |
| 1794 | 11,000,000 | 4 | 10 | 7 |
| 1795 | 18,000,000 | 4 | 15 | 8 |
| 1796 | 18,000,000 | 4 | 14 | 9 |
| 1796 | 7,500,000 | 4 | 12 | 2 |
| 1797 | 18,000,000 | 5 | 14 | 1 |
| 1797 | 14,500,000 | 6 | 6 | 10 |
| 1798 | 17,000,000 | 6 | 4 | 9 |
| 1799 | 3,000,000 | 5 | 12 | 5 |
| 1799 | 15,500,000 | 5 | 5 | 0 |
| 1800 | 20,500,000 | 4 | 14 | 2 |
| 1801 | 28,000,000 | 5 | 5 | 5 |
| **LOANS OF THE WAR WITH THE FRENCH EMPIRE.** | | | | |
| 1803 | 12,000,000 | 5 | 2 | 0 |
| 1804 | 14,500,000 | 5 | 9 | 2 |
| 1805 | 22,500,000 | 5 | 3 | 2 |
| 1806 | 20,000,000 | 4 | 19 | 7 |
| 1807 | ——— | ——— | | |
| 1808 | ——— | ——— | | |
| 1809 | ——— | ——— | | |

The loan for the present year (1810) of eight millions for Great Britain and four millions for Ireland, has been contracted for on terms more favourable to the public than since the year 1793. For every 100l. subscribed there have been given 130l. of 3 per cent. consolidated annuities, being a rate of interest of only 4l. 4s. 3d. per cent; very nearly the same as the rate of the loan for 1763.

LOANDA, or ST. PAUL DE LOANDA, an island in the Atlantic, near the coast of Angola, about six leagues in length, and half a league wide, divided from the Continent by a narrow channel, which forms a good harbour. The soil is unfruitful for grain; but fruits, such as oranges, figs, citrons, &c. abound. It contains seven or eight villages. On the coast are found shell-fish, called zimbi, used for money by the natives, like cowries in the Indies.

LOANDA, or *St. Paul de Loanda*, a seaport town of Africa, in the kingdom of Angola, and capital of a fertile province, called Loanda, in possession of the Portuguese. The see of a bishop, and containing several churches, convents, and about 5000 inhabitants, of which only 1000 are whites, the rest are blacks or mulattoes. The country abounds in cattle and sheep; Indian corn, millet, manioc, and fruits. Long. 13. 15. E. Lat. 8. 30. S.

LOANGO, a kingdom of Africa, in Congo, 250 miles in length, and 188 in breadth; bounded on the north by Benin, on the east by parts unknown, on the south by Congo Proper, and on the west by the Atlantic Ocean. The land is so fruitful, that it yields three crops of millet in a year; and there are a great number of trees, whence palm wine is drawn. The women cultivate the ground, sow, and get in the harvest. The inhabitants are black, well made, mild, and tractable.

LOANGO, a town of Congo, capital of a kingdom of the same name, with a harbour, at the mouth of the Quilla. The principal trade consists in elephants' teeth, copper, tin, lead, iron, and slaves. Long. 11. 45. E. Lat. 4. 15. S.

LOANO, or LOVANO, a town of Italy, in the state of Genoa, near the sea, six miles south-south-west of Finale. Long. 7. 58. E. Lat. 44. 9. N.

LOA'SA. In botany, a genus of the class polyandria, order monogynia. Calyx five-leaved; petals five; capsule half-inferior, one-celled, half three-valved, many seeded. Six species: natives of Peru and Buenos Ayres.

LOATH. *a.* (lað, Saxon.) Unwilling; disliking; not ready; not inclined (*Southern*).

*To* LOATHE. *v. a.* (from *loath.*) 1. To hate; to look on with abhorrence (*Sid.*) 2. To consider with the disgust of satiety (*Cowley*). 3. To see food with dislike (*Quincy*).

*To* LOATHE. *v.n.* 1. To create disgust; to cause abhorrence (*Sp.*) 2. To feel abhorrence or disgust (*Exodus*).

LO'ATHER. *s.* One that loathes.

LO'ATHFUL. *a.* (*loath* and *full.*) 1. Abhorring; hating (*Spenser*). 2. Abhorred; hated (*Spenser*).

LO'ATHINGLY. *a.* (from *loath.*) In a fastidious manner.

LO'ATHLY. *a.* (from *loath.*) Hateful; abhorred; exciting hatred (*Shakspeare*).

LO'ATHLY. *ad.* (from *loath.*) Unwillingly; without liking or inclination (*Don.*)

LO'ATHNESS. *s.* (from *loath.*) Unwillingness (*Bacon*).

LO'ATHSOME. *a.* (from *loath.*) 1. Abhorred; detestable (*South*). 2. Causing satiety or fastidiousness (*Shakspeare*).

LO'ATHSOMENESS. *s.* (from *loathsome.*) Quality of raising hatred (*Addison*).

LOAVES. The plural of *loaf.*

LOB. *s.* 1. Any one heavy, clumsy, or sluggish (*Shakspeare*). 2. Lob's pound; a prison (*Hudibras*). 3. A big worm (*Walton*).

*To* LOB. *v. a.* To let fall in a slovenly or lazy manner (*Shakspeare*).

LOBARIA. In zoology, a genus of the class vermes, order mollusca. Body above convex; beneath, flat; lobate: one species only, possessing a tail with four lobes, and found in the Northern Seas.

LO'BATE, or LOBED LEAF. In botany, *Divisum ad medium in partes distantes, marginibus convexis.* Divided to the middle into parts distant from each other, with convex margins. The latter clause is omitted in *Delin. Pl.* and yet it seems necessary to distinguish this from *folium fissum*, the cleft or cloven leaf. These leaves take the names of *bilobate*, *trilobate*, &c. or *two-lobed*, *three-lobed*, &c. from the number of lobes into which they are divided.

LOBAW, a town of Western Prussia, with a castle, where the bishop of Culm resides. It is 25 miles E. of Culm. Long. 19. 0. E. Lat. 53. 25. N.

LOBBY, in architecture, is a small hall or waiting room: it is also an entrance into a principal apartment, where there is a considerable space between that and a portico or vestibule, and the length or dimensions will not allow it to be considered as a vestibule or an anti-room.

LOBE. *s.* (λοβὸς.) A division; a district part; used commonly for a part of the lungs. See PULMO.

LOBE. In botany, the part into which some simple leaves are divided. Also the *placenta*, *cotyledon*, or main body of the seed destined to nourish the corol, splitting usually in two; these parts are called the lobes. See COTYLEDON.

LOBE'LIA. Cardinal-flower. In botany, a genus of the class pentandria, order monogynia. Corol irregular, longitudinally cloven on its upper side; stigma capitate; anthers united into a tube; capsule inferior, two or three-celled. Fifty species: chiefly natives of the Cape, East and West Indies; a few of Europe; and one, L. Dortmanna, with linear, two-celled, very entire leaves; scape simple, nearly leafless, common to our own lakes.

The species most worthy of notice, is L. Syphilitica: a native of Virginia, with erect stem; leaves ovate-lanceolate, slightly serrate, alternate sessile; calyx with five halbert-shaped leaflets, fringed at the margin; L. blue flowers.

The root of this plant is the part directed by the Edinburgh Pharmacopœia for medicinal use; in taste it resembles tobacco, and is apt to excite vomiting. It derived the name of *syphilitica* from its efficacy in the cure of syphilis, as experienced by the North American Indians, who considered it a specific in that disease, and with whom it was long an important secret, which was purchased by Sir William Johnson, and has been since published by different authors. The method of employing this medicine is stated as follows: A decoction is made of a handful of the roots in three measures of water. Of this, half a measure is taken in the morning fasting, and repeated in the evening: and the dose is gradually increased till its purgative effects become too violent, when the decoction is to be intermitted for a day or two, and then renewed, until a perfect cure is effected. During the use of this medicine, a proper regimen is to be enjoined, and the ulcers are also to be frequently washed with the decoction, or, if deep and foul, to be sprinkled with the powder of the inner bark of the New Jersey tea-tree, *Ceanothus americanus.* Although the plant thus used is said to cure the disease in a very short time, yet it is not found that the antisiphilitic powers of the lobelia have been confirmed in any instance of European practice; but we have various facts and arguments to induce our belief that the syphilis is more easily cured among people of simple regimen and manners, than among those of fuller diet and more voluptuous life.

LOBEL'S CATCH FLY, in botany. See SILENE.

LOBENSTEIN, a town of Upper Saxony, in the county of Reussen, 26 miles N. of Bareith. Long. 11. 37. E. Lat. 50. 20. N.

LOBINEAU (Guy Alexis), a French ecclesiastic, who distinguished himself by some historical works of reputation: 1. A History of the Conquest of Spain by the Moors; 2. A History of Paris; 3. A Translation of Polybius. He died in 1727, aged 44.

LOBLOLLY BAY, in botany. See GORDONIA.

LOBO (Jerome), a Portugueze jesuit, who travelled into the very heart of Abyssinia, as a missionary, and published a curious account of that country, which was rendered into French by Le Grand, and translated into English by Dr. Johnson. Lobo died rector of the college of Coimbra, in Portugal, in 1678.

LOBO (Rodriguez Francis), a Portugueze

poet, was born in Estramadura, and wrote a comedy, called Euphrosyne, which is a great favourite among his countrymen. He was also the author of a folio volume of poems, printed in 1721.

LOBOA, a town of Spain, in Estramadura, seated on the Guadiana, 22 miles E. of Badajoz. Lon. 6. 22. W. Lat. 38. 32. N.

LOBSTADT, a town of the electorate of Saxony, in the circle of Leipsic, 10 miles S. S. E. of Leipsic.

LOBSTER, in entomology. See CANCER.

LOBURG, a town of Lower Saxony, in the principality of Magdeburg, 22 miles E. of Magdeburg. Lon. 12. 7. E. Lat. 52. 12. N.

LO'CAL. *a.* (*locus*, Latin.) 1. Having the properties of a place (*Prior*). 2. Relating to place (*Stillingfleet*). 3. Being in a particular place (*Digby*).

LOCAL PROBLEM, among mathematicians, is one that is capable of an infinite number of different solutions; because the point, which is to solve the problem, may be indifferently taken within a certain extent; as suppose any where in such a line, within such a plane figure, &c. which is called a geometrical locus.

A local problem is simple, when the point sought is in a right line; plane, when the point sought is in the circumference of a circle; solid, when it is in the circumference of a conic section; or sursolid, when the point is in the perimeter of a line of a higher kind.

LOCA'LES. The fourth class of Cullen's nosology, which comprehends morbid affections that are partial, and includes eight genera, viz. dysæsthesiæ, dysorexia, dyscinesia, apocenoses, epischeses, tumores, ectopia, and dialyses.

LOCA'LITY. *s.* (from *local.*) Existence in place; relation of place, or distance (*Glanville*).

LO'CALLY. *ad.* (from *local.*) With respect to place (*Glanville*).

LOCARNO, a town of Swisserland, capital of a district of the same name, which is one of the four transalpine bailiwicks. It contains 1500 inhabitants. Part of the town is built on piazzas, in the form of a crescent, with two wings; and, in the front, is a row of trees, and the public walk. The old part of the town is dirty, and the streets are narrow. It contains three convents, and a small Franciscan monastery, perched on a rock overhanging the valley, and commanding a view of the lake of Locarno and its magnificent boundaries. The canopy in the church of the Capuchins, deserves to be mentioned for its beautiful execution; it is of straw work, and almost rivals velvet or gold fringe. Locarno was once situate on the lake, and had a port capable of receiving large barks; at present it stands at the distance of a quarter of a mile, which is owing to the accumulation of sand brought down by the torrent Maggia. It is 46 miles N. of Novara, and 55 N. by W. of Milan. Lon. 8. 51. E. Lat. 46. 10. N.

LOCARNO, Lake of. See MAGGIORE.

LOCA'TION. *s.* (*locatio*, Latin.) Situation with respect to place; act of placing; state of being placed (*Locke*).

LOCCO, a town of Naples, in Abruzzo Citeriore, situate on the Pescara, 10 miles N. of Solmona.

LOCH, the Scottish name for lake, as *Loch Tay*.

LOCHABER, a bleak, barren, mountainous, and rugged district, in the S. W. part of Invernessshire.

LOCHE, in ichthyology. See COBITIS.

LOCHEM, a town of Dutch Guelderland, in the county of Zutphen. It was taken by the French, in 1672, who abandoned it in 1674, after having demolished the fortifications. It is seated on the Borrel, 10 miles E. of Zutphen. Lon. 6. 13. E. Lat. 52. 12. N.

LOCHES, a town of France, in the department of Indre and Loire, with a strong castle, the prospect from which is very extensive. Here was one of those horrid dungeons, built by the cruel Lewis XI. the walls, floors, ceilings, and doors, of which were lined with plates of iron fastened to bars of the same metal. The unfortunate Ludovic Sforza, duke of Milan, taken in battle, under Lewis XII. ended his days in one of them. In the choir of the late collegiate church, is the tomb of the celebrated Agnes Sorel, mistress of Charles VII. to whose patriotic exhortations that monarch owed almost all his glory. Loches is seated on the Indre, near a forest, 15 miles south of Amboise, and 20 S. E. of Tours. Long. 0. 51. E. Lat. 47. 10. N.

LOCHIA, (*Lochia*, *orum*, n. pl. λοχια, from λοχευω, to bring forth). The cleansings. The serous, and for the most part green-coloured, discharge, that takes place from the uterus and vagina of women, during the first four days after delivery.

LOCHIORRHŒA, (*Lochiorrhœa*, *æ*, f. λοχιορροια, from λοχια, and ρεω, to flow). An excessive discharge of the lochia.

LOCHMABEN, a borough in Dumfriesshire, situate on the west-side of the Annan, nearly opposite the place where it receives the united streams of Yea and Kinnel, 10 miles N. E. of Dumfries. Long. 3. 19. W. Lat. 55. 19. N.

LOCHRIDA, or OCRIDA, a town of Turkey in Europe, in Albania, with a Greek archbishop's see. It is well fortified, and seated on a hill, near a lake of its own name, 62 miles S. E. of Durazzo. Lon. 20 40. E. Lat. 41. 40. N.

LOCHTA, a sea-port of Sweden, in East Bothnia, seated on the gulf of Bothnia, 90 miles south of Tornea. Lon. 24. 16. E. Lat. 64. 20. N.

LOCHWINNOCH, a lake in Renfrewshire, called also Castle Semple Loch, near three miles in length. On an island in this

lake, is an old fortress, called the Peel; a name frequently given to old fortresses in Scotland. From this lake issues the river Black Cart.

LOCHY, Loch, a lake in the S. W. part of Invernessshire, 10 miles in length, and from one to two in breadth. From the N. W. the waters of Loch Arkek descend into this lake. Out of it runs the river Lochy, which, about a mile below, receives the Spean, and after flowing through the district of Lochabar, falls into Loch Eil, at Fort William.

LOCI, the plural of *Locus*, which see.

LOCK. *s.* (loc, Saxon.) 1. An instrument composed of springs and bolts, used to fasten doors or chests (*Spenser*). 2. The part of the gun by which fire is struck (*Grew*). 3. A hug; a grapple (*Milton*). 4. Any inclosure (*Dryden*). 5. A quantity of hair or wool hanging together (*Spenser*). 6. A tuft (*Addison*).

*To* LOCK. *v. a.* (from the noun.) 1. To shut or fasten with locks (*Dryden*). 2. To shut up or confine, as with locks (*Shaks.*) 3. To close fast (*Gay*).

*To* LOCK. *v. n.* 1. To become fast by a lock (*Spenser*). 2. To unite by mutual insertion (*Boyle*).

Lock, according to the first of the above acceptations, is reckoned the master piece in smithery; a great deal of art and delicacy being required in contriving and varying the wards, springs, bolts, &c. and adjusting them to the places where they are to be used, and to the various occasions of using them.

From the various structure of locks, accommodated to their different intentions, they acquire various names. Those placed on outer doors, are called stock-locks; those on chamber-doors, spring-locks; those on trunks, trunk-locks, pad-locks, &c.

Of these, the spring-lock is the most considerable, both for its frequency, and the curiosity of its structure.

The common lock which is used for doors is shewn in plate 97 fig. 1. It is of that kind called a tumbler or spring lock. The bolt which secures the door by means of the key is marked A: it passes through the end of the box which encloses the whole lock, and at the other end is guided by a bridge B. screwed to the bottom of the box, that it may move freely and steadily backwards and forwards, it is secured in either position by means of a lever, called the tumbler which is represented at D. by dotted lines. It is placed under the great bolt A; which is at that part but half the thickness it is at the end where it passes through the lock; the tumbler has a square stud *m* dotted projecting upwards from it and is thrown forwards towards the key hole by a spring *a*. The bolt has two square studs *n* and *o* dotted projecting downwards from its lower surface, there to engage that on the tumbler, and prevent its being moved without the key, which is inserted through the key hole and turns round upon *d* as a center: in its motion it first engages the tumbler D, and throws it backwards far enough for its stud *m* to clear the stud *n* under the great bolt A. The bolt is now released, and the key acting on the side of the notch *e* throws it forwards; when the key has passed by, the spring *a* of the tumbler forces it into its original position and by its stud *m* acting against the other side of *n* retains the bolt from being forced back. In this position the bolt is half locked; and by repeating the same operation it may be protruded twice the distance, and in this state it is full locked. Locks of this kind admit of two securities from being picked, first in the wards *h h* which surround the key hole and prevent the introduction of a false key; and secondly in the length of the key, which must be accurately adapted to the lock; for if it be too long it will pitch against the projecting point *b* of the bolt and prevent its moving farther, and if the key is too short it will not throw the tumbler D. far enough back to clear the studs *n* and *o* of the bolt. The wards *h h* are made in various forms at the discretion of the workman: those which are to be in the middle of the key are riveted to a plate E. which is supported at some distance above the plate of the lock, that one part of the key may pass over and the other under it.

The other part of the lock in fig. 1. is the spring latch F, which is smaller than the great bolt and is guided in the same manner: beyond the bridge B, it is turned at right angles and is thrown forwards by a spring *f*, to draw it back and release the door a lever G, is employed. This has a square hole through it to receive the handle of the lock; when the handle is turned round either way one end of the lever pushes against the crooked part of the latch, and forces it back; as soon as the pressure on the handle is taken off, the spring *f* returns the bolt to its original position. The face of the latch at H is filed to a bevel, that when the door is shut, it may push back the latter and fasten the door without making use of the handle. I is a small bolt to fasten the door from the inside, it is moved by a handle K coming through the lower part of the lock, and a small spring beneath it causes such a friction that it will not be liable to move too easily.

Figs. 2, 3, 4, and 5, represent a good construction of Stansbury's patent lock, which is on a different principle from most others.—A A is the box which contains the lock; the bolt is fitted to turn on a center pin *a* so that when the bolt is turned out it engages the door and is locked as in fig. 2.: when unlocked the side *h h* is turned where the bolt now projects; the bolt is then at liberty. But when locked it is kept so by 4 pins at *d* which pass through the brass plate on which the bolt of the lock turns,

*Fig. 1. Common Tumbler Lock.*

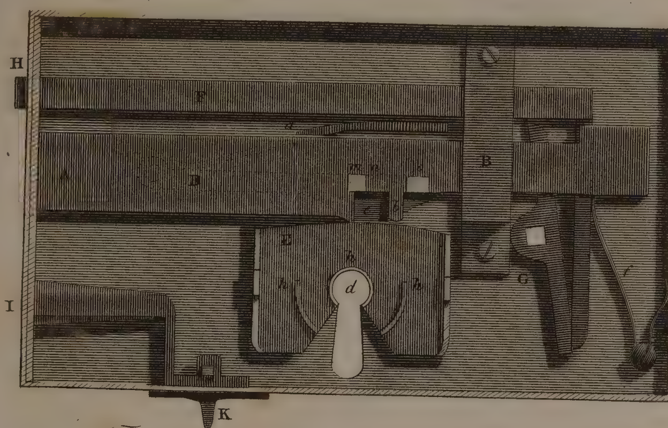
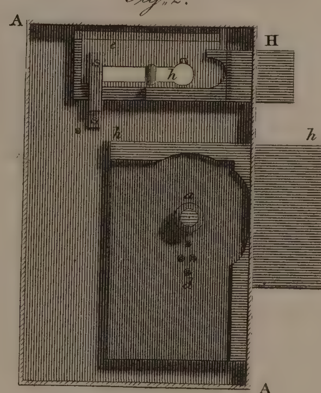



*Fig. 4.*


*Fig. 2.*




*Stansbury's Patent Lock.*

*Fig. 5.*

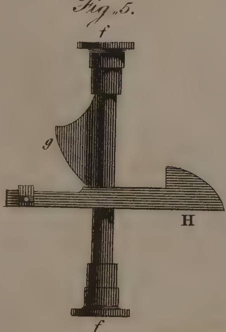
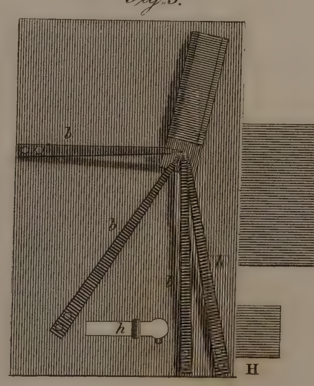



*Fig. 3.*

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Mutlow Sc. Russell Ct.

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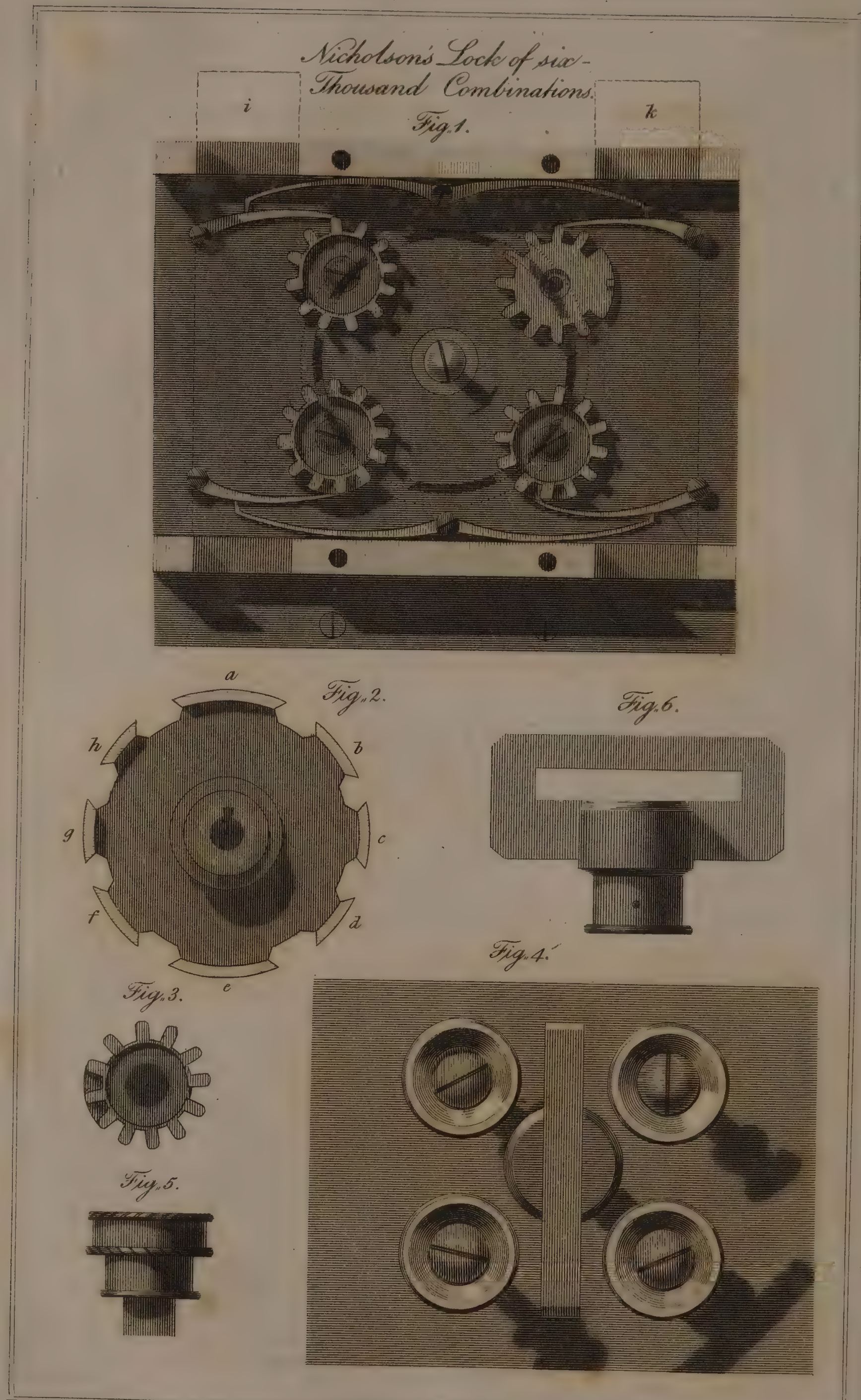



Mutlow Sc. Russell Co.

Published by G. Kearsley, Fleet Street, Sept. 1st 1810.

and are urged upwards by a spring *b* fig. 3. applied to each pin, the bolt is perforated with holes adapted to these pins so that when it is brought into the right position, the pins are thrown upwards by their springs and pin, or fasten the bolt and plate of the lock together, so that the lock cannot be opened without the aid of the key fig. 4. which has the same number of pins projecting from its under surface as the pins in the bolt; and the length of the pins is exactly the same as the thickness of the bolt.

To unlock this lock the key is introduced through the key hole and pressed hard upon the bolt while it is turned round upon the center pin *a*. When the pins in the key come over those in the bolt the pressure of the hand will force the pins at *a* down through the bolt and the key having thus hold of the bolt it will when turned round bring the bolt with it and unlock. This lock is very safe from being picked: even if the lock is laid open as in fig. 2. there is some difficulty in turning the bolt; for all the pins must be pressed down at the same time to clear the bolt and they must also be forced down the proper depth and no more: for if they are not thrust down low enough the pins will continue to hold the bolt, and if too low the pin by which they are forced down will keep the bolt locked. The same applies to the use of a false key, with the additional difficulty of its having the right number of pins, their proper order and distance from the center, and their size and length. If the false key is deficient in any of these points it will not succeed in opening the lock. To mislead any one who may attempt to take an impression of the key by introducing a piece of wax &c. into the lock, a number of false pins are marked on the bolt by a punch so that they shall give the same impression as the real pins. The spring latch H of this lock is also new, it is forced forwards by a spiral spring *e* and is drawn back by means of a wedge *g* which is applied to the handle *f*, fig. 5. The handle slides freely through the lock, and the steel wedge *g* fig. 5. acting upon a small roller *h* in the bolt draws it back when the handle is thrust forward; by this means the operation of opening the door from the outside is performed by *pushing forwards* the handle, the wedge then withdraws the latch and the continuance of the pressure on the handle opens the door. In the same manner, by *pulling* the handle withinside, the door will be opened.

The following, according to Mr. Nicholson, are the conditions which appear necessary in a lock of the most perfect kind.

1. That certain parts of the lock should be variable in position through a great number of combinations, one only of which shall allow the lock to be opened or shut.

2. That this last mentioned combination should be variable at the pleasure of the possessor.

3. That it should not be possible, after the lock is closed and the combination disturbed, for any one, not even the maker of the lock, to discover by any examination what may be the proper situations of the parts required to open the lock.

4. That trials of this nature shall not be capable of injuring the work.

5. That it shall require no key;

6. And be as easily opened in the dark as in the light.

These conditions are in some respects liable to the inconveniences already mentioned. He therefore adds the following conditions:

7. That the opening and shutting should be done by a process as simple as that of a common lock.

8. That it should open without a key, or with one, at pleasure.

9. That the key-hole be concealed, defended, or inaccessible.

10. That the key may be used by a stranger without his knowing or being able to discover the adopted combination.

11. That the key be capable of adjustment to all the variations of the lock, and yet be simple.

12. That the lock should not be liable to be taken off and examined, whether the receptacle be open or shut, except by one who knows the adopted combination.

In meditating upon this mechanical problem, our ingenious journalist thought of various constructions, but has not yet matured one in which all the above conditions are complied with. The lock delineated in Plate 98. possesses the first six requisites. Fig. 1. represents the plate of the lock, of which the other side is seen at Fig. 4. In this last figure the middle piece is a handle or knob, represented at Fig. 6. which, when turned, serves to shoot the double bolt *i k*, Fig. 1. by any common connection. In the actual lock this bolt is carried backward and forward by a pin standing out of Fig. 2. soon to be described. The other four circles in Fig. 4. are handles, represented in Fig. 5. which serve to move the four wheels seen in Fig. 1. These wheels have twelve teeth each, and are fastened by center-screws, each upon a flat wheel of the same tooth; but having only ten notches actually cut, as is seen in the right hand upper corner, where one of the upper wheels is taken off, and is shewn at Fig. 3. These upper wheels have their toothed part considerably higher than the interior or flat part; so that they would be contrate wheels if the teeth were cut quite through. But this is not the case, except with two of the notches, as may be seen in the two lower wheels more particularly, and also in the others. The upper wheels have also two of the notches between the teeth stopped up, as is shewn in Fig. 3;

by which contrivance there are but ten situations for screwing each wheel upon its correspondent under wheel; and these situations are rendered precise, and all relative motion between the two correspondent wheels prevented by a small stud seen in the uncovered wheel, Fig. 1. which fits into one of the notches of the upper wheel when put in its place. The upper wheel has a number on each tooth from 1 to 9 and 0, which are of use for placing this stud. The four under wheels are held in their situations by four spring-catches, which allow them to be turned, in one direction only, by means of their knobs or handles; and when any wheel is thus turned round, the finger and thumb will feel the stroke of the lever, as it successively falls into each notch, until the lever comes to rest upon the smooth part. This very palpable indication then shews when to begin to count, calling the first hold or stroke of the catch 1; the second 2; the third 3, &c.; and the lock is so constructed, that when the top wheel of any of the four couples is put on with any number opposite the stud, the same number counted by the catch will place the upper wheel in such a situation, as that its notches, which pass clear through, will lie in a circle described from the center or axis upon which the great handle turns. And therefore, when each of these wheels is put in its place, and the numbers known (and registered, or put in the memory by some artificial association, such as the date of the year taken either backwards or forwards, &c.) it is only needful to move each of the four knobs till its catch has passed the smooth part, with a number of strokes answering to its adjustment, and the circle indicated by broken shaded lines in Fig. 1. will be capable of passing through the open spaces of every one of the wheels. Fig. 2. represents a contrate wheel, having its irregular portions A, B, C, D, &c. standing up above its plane. These portions are parts of a circle equal to that denoted by the broken shaded parts in Fig. 1. The contrate wheel is to be placed in Fig. 1. with its face turned down; and being there screwed with its centre to the central handle, it serves to open and shut the bolt, which it can only do when the four wheels are in such a situation as to allow the circular edge-parts of Fig. 2. to pass clear through their notches. If any one or more of those wheels be turned so as not to correspond with its number, it will be impossible to turn the handle, because every attempt to do so will cause one of the parts of Fig. 2. to stop in one of the notches of the wheels through which it cannot pass. The method of opening the lock will therefore consist in setting each wheel to its known number.

As the proper situation of each wheel is only one out of ten, it is nine to one against any operator upon this lock, that he shall not set the first wheel right, supposing all the others in their due positions; but it is true that he may try all round, and will come to the right place at last. If two only of the wheels were deranged, it would be eighty-one to one that he should not set them both right; and he would be deprived of any trial round a single wheel, because the other wheel would always hold against him, and prevent his knowing when the open notch of the wheel under trial presented itself. Three wheels deranged would make the odds 729 to one, and the four would make the odds 6561. If a fifth wheel were added to this lock, the odds would amount to 59049.

As the quantity cut from Fig. 2. is not more than was necessary for the clear rotation of the wheels when the lock is shut, this piece, when in every other position, prevents the other wheels from being turned at all (*Phil. Jour.*)

LOCK, or Weir, in inland navigations, the general name for all those works of wood or stone made to confine and raise the water of a river: the banks also which are made to divert the course of a river, are called by these names in some places. But the term lock is more particularly appropriated to express a kind of canal inclosed between two gates; the upper called by workmen the sluice-gate, and the lower called the flood-gate. These serve in artificial navigations to confine the water, and render the passage of boats easy in moving up and down the stream. See Canal.

LOCKS, or Entravons, in the manege, pieces of leather, two fingers broad, turned round and stuffed on the inside, to prevent their hurting the pastern of a horse, round which they are fixed. An entrave is composed of two entravons, joined by an iron chain seven or eight inches long.

LOCKART (Alexander), a Scotch writer, was born near Edinburgh, in 1673, and bred to the law. He sat in parliament at the time of the union, and strongly opposed the measure; as he also did the Hanover succession, being firmly attached to the house of Stuart. He was killed in a duel, in 1732. His Memoirs of Scotland were published at London, in 1714.

LOCKE (John), a most eminent English moral philosopher and metaphysician, was born at Wrington, not far from Bristol, on the 29th of August, 1632. He studied first at Westminster-school, whence he removed to Christ-church in Oxford, and there discovered such a genius for the sciences, that he soon passed for one of the most judicious critics of his time: he was, however, highly disgusted at the method of study then pursued in the university, there being nothing taught there but the Aristotelian philosophy, embarrassed with obscure terms and useless questions. He disapproved also of the formal disputes held in the schools, which he thought only served to produce

or nourish prejudices and ostentation. The first books which gave him a relish for the study of philosophy, were those of Des Cartes; for though he afterwards followed opinions contrary to those of that philosopher, yet he admired him for his perspicuity. Mr, Locke also applied himself to the study of physic, in which the learned Sydenham allows that he made a very great progress; but he never took upon himself that profession. In 1664, he went to Germany, was secretary to Sir William Swan, envoy from the English court to the elector of Brandenburgh, but in less than a year returned to England, where he applied himself to the study of natural philosophy at Oxford, and there became acquainted with the lord Ashley, afterwards earl of Shaftesbury, who introduced him into the conversation of the most learned men of that time, with whom he contracted a strict friendship, which lasted as long as his life. In 1668, he attended the earl and countess of Northumberland into France. At his return to England, he lived with the lord Ashley, as he had done before, and took upon himself the care of his son's education. That nobleman being made lord chancellor of England, in 1672, appointed him secretary of the presentations, which place he held till the end of 1673, when the earl resigned the great seal. Mr. Locke was the same year made secretary to a commission of trade; but that commission being dissolved in December 1674, and finding himself threatened with a consumption, he went the next year to Montpellier, where he staid a considerable time, and there became acquainted with the lord Herbert, earl of Pembroke. Some time after, the earl of Shaftesbury being retired to Holland, Mr. Locke went to him there, and contracted an intimate friendship with Limborch, Le Clerc, and other learned men. He was then accused at court of having composed certain tracts against the government, printed in Holland, on which his place of student of Christ-church was taken from him, by a special order from king Charles II.; but these tracts were afterwards discovered to be written by another person. After the death of king Charles II. Mr. William Penn offered his interest to procure a pardon for him from king James II.; but Mr. Locke said he had no need of a pardon, since he had not been guilty of any crime. In 1687, the English envoy at the Hague demanded him, and 83 other persons, to be delivered up by the States-General, for being concerned in the duke of Monmouth's rebellion, though he held no correspondence with him. This obliged Mr. Locke to keep himself concealed for several months, till his innocence being known, he again appeared in public. In 1689, he returned to England, in the fleet which convoyed the princess of Orange. He might then have easily obtained a very considerable post; but he contented himself with being one of the commissioners of appeals, worth 200l. per annum. About the same year, he was asked to go abroad, as envoy to the emperor, or any other court where the air would be most suitable to him; but he waved it on account of his ill state of health. In 1695, he was appointed one of the commissioners of trade and plantations, a place worth 1000l. per annum, which he discharged with great success till the year 1700, when he resigned, on account of his asthmatic disorder. After he had resigned his commission, he lived at Oates, in Essex, a country seat of Sir Francis Masham's, where he spent the remainder of his life in the study of the Scriptures, and died there the 28th of October, 1704, in the 73d year of his age. His writings will immortalize his name. The earl of Shaftesbury, author of the Characteristics, though in one place he speaks of Mr. Locke's philosophy with severity, yet observes, concerning his Essay on the Human Understanding, in general, "that it may qualify men as well for business and the world, as for the sciences and the university." Whoever is acquainted with the barbarous state of the philosophy of the human mind, when Mr. Locke undertook to pave the way to a clear notion of knowledge, and the proper methods of pursuing and advancing it, will be surprised at this great man's abilities; and plainly discover how much we are beholden to him for any considerable improvements that have been made since. His Discourses on Government, Letters on Toleration, and his Commentaries on some of St. Paul's Epistles, are justly held in the highest estimation.

LOCKED JAW. *Trismus.* A species of tetanus. See TETANUS.

LOCKER GOULAND'S, in botany. See TROLLIUS.

LOCKER. *s.* (from *lock.*) Any thing that is closed with a lock; a drawer (*Crusoe*).

LO'CKET. *s.* (*loquet*, French.) A small lock; any catch or spring to fasten a necklace, or other ornament (*Hudibras*).

LO'CKRAM. *s.* A sort of coarse linen (*Shakspeare*).

LOCRI, a town of Magna Græcia, in Italy, on the Adriatic, not far from Rhegium. It was founded by a Grecian colony, about 757 years. The inhabitants were called Locrenses (*Virg.*)

LOCRIS, a county of Greece, whose inhabitants are known by the name of Ozolæ, Epicnemidii, and Opuntii.

LO'CRON. *s.* A kind of ranunculus.

LOCOMO'TION. *s.* (*locus* and *motus*, Lat.) Power of changing place (*Brown*).

LOCOMO'TIVE. *a.* (*locus* and *moveo*, Lat.) Changing place; having the power of removing or changing place (*Derham*).

LO'CULAMENT. In botany, the cell of a pericarp or fruit. *Concameratio vacua pro seminum loco. Pericarpium uniloculare, bi-*

loculare, &c. A unilocular or one-celled; a bilocular or two-celled pericarp. If any one dislikes these compound words, he may write—a pericarp of one cell—of two cells, &c. And this may serve as a general rule in the like cases.

LO'CULUS. In botany, the little cell of an anther containing the pollen. *Loculi—divisiones laterales, tunicis factæ.*

LOCUS, *place*, in the general sense. See PLACE.

LOCUS, among ancient musicians, was used to signify the interval between one degree of acuteness, or gravity of sound, and another. The Greeks used the word τοπος in the same sense, for the space through which the voice moved. See MOTION.

This motion the Greeks distinguished into two kinds: the one continued, συνεχη, the other disjunct, διαςηματικη.

Instances of the first kind are in speaking; of the second, in singing; and this they called melodic motion, or what was adapted to singing. Ptolemy, in like manner, divides sounds of unequal pitch, ψοφυς ανισοτονυς, into continued and discrete, and says the first kind are improper, and the second proper, for harmony.

Aristides Quintilianus interposes a third kind of motion between the two here mentioned such as that of a person reciting a poem.

LOCUS geometricus denotes a line, by which a local or indeterminate problem is solved. See LOCAL PROBLEM.

A locus is a line, any point of which may equally solve an indeterminate problem.

This, if a right line suffice for the construction of the equation, is called *locus ad rectum*; if a circle, *locus ad circulum*; if a parabola, *locus ad parabolum*; if an ellipsis, *locus ad ellipsim*; and so of the rest of the conic sections.

The *loci* of such equations as are right lines, or circles, the ancients called *plain* or *plane loci*; and of those that are parabolas, hyperboles, &c. *solid loci*.

Apollonius of Perge wrote two books on *Plane Loci*, in which the object was "to find the conditions under which a point varying in its position, is yet confined to trace a straight line or a circle given in position." These books are lost; but attempts have been made at *restorations*, by Schooten, Fermat, and R. Simson; the treatise *De Locis Planis*, of the latter-mentioned geometer, published at Glasgow, in 1749, is a very elegant work. We shall here specify some of the chief propositions relative to plane loci.

1. If a straight line, drawn through a given point to a straight line given in position, be divided in a given ratio, the *locus* of the point of section is a straight line given in position.

2. If a straight line drawn through a given point to the circumference of a given circle, be divided in a given ratio, the *locus* of the point of section will also be the circumference of a given circle.

3. If through a given point two straight lines be drawn in a given ratio, and containing a given angle; if the one terminate in a given circumference, the other will also terminate in a given circumference.

4. The middle point of a given straight line which is placed between two lines that include a right angle, lies in the circumference of a given circle.

5. If a straight line drawn from a given point to a straight line given in position, contain a given rectangle, the *locus* of its point of section will be a given circle.

6. If two straight lines in a given ratio, and containing a given angle, terminate in two diverging lines which are given in position, the *locus* of their vertex will be likewise a straight line given in position.

7. If from two given points there be drawn two straight lines, of whose squares the difference is given, the *locus* of their point of concourse will be a straight line given in position. In other words, if the base of a triangle, and the difference of the squares of the two other sides be given, the vertex of the triangle will fall in a right line gi en in position.

8. If from two given points there be drawn two straight lines in a given *unequal* ratio, the *locus* of their point of concourse is a given circle: if the ratio be one of equality, the *locus* is a right line given in position.

9. If from given points there be drawn straight lines, whose squares are together equal to a given space, their point of concourse will terminate in the circumference of a given circle.

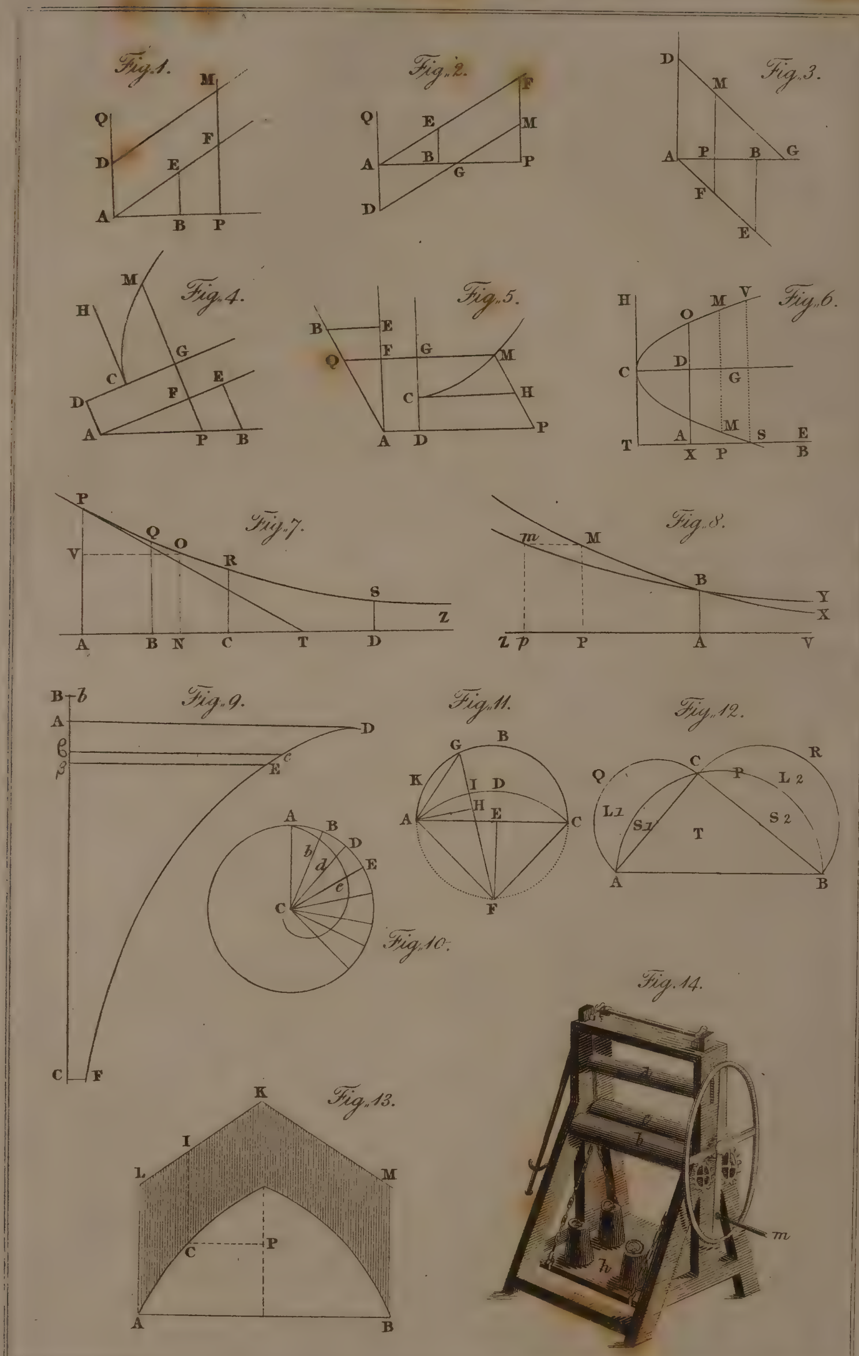
10. If the base and vertical angle of a plane triangle be given, the vertex will fall in a given circle.

11. If in any triangle the base be given, and the sum of the squares of the two other sides, the *locus* of the vertex is a given circle.

12. If right lines be drawn from a given point, to cut a given circle, and from the points of intersection there be taken, upon these lines (on either side), lines in a constant given ratio to the distance between the respective points of intersection and the given point; the *locus* of the points so determined will be a circle.

13. If two circles cut each other, and through either point of intersection a right line be drawn, cutting both the circles, then, if a right line be always taken thereon, from one of those points, in a given ratio to the part intercepted between the circles, the *locus* of the points so determined will be a circle.

14. If two circles cut each other, and through either intersection a right line be drawn, cutting both the circles, then, if a right line be always taken thereon, from

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one of those points, in a given ratio to the part between the other point and intersection, the *locus* of the points so determined will be a circle.

15. If triangles be inscribed in a given segment of a circle, and from the vertex, on either side (produced if necessary) there be taken (either way) a right line always in a constant ratio to either of the sides, or to their sum, or difference, the *loci* of the points so determined will be circles.

16. If a triangle be inscribed in a given segment of a circle, and lines be drawn from the vertex of the triangle to the vertices of the opposite segments, and parts be taken either way thereon, from the vertex of the triangle, in any constant ratio to either of the sides, the *loci* of the points so determined will be circles. Also, if those points be taken on the lines drawn to the vertex of the given segment in any constant ratio to the difference of the sides of the triangle; or on the lines drawn to the vertex of the opposite segment, in any constant ratio to their sums, the *loci* of the points so determined will be circles.

Wolfius, and most other moderns after him, divide the *loci* very commodiously into orders according to the number of dimensions to which the indeterminate quantities rise. Thus it will be a locus of the first order, if the equation be $x=ay$; a locus of the second or quadrate order, if $y^2=ax$, or $y^2=a^2-x^2$, &c. a locus of the third or cubic order, if $y^3=a^2x$, or $y^3=ax^2-x^3$, &c.

The better to conceive the nature of the locus, suppose two unknown and variable right lines AP, PM (Pl. 93. figs. 11. 12.) making any given angle APM with each other; the one whereof, as AP, we call $x$, having a fixed origin in the point A, and extending itself indefinitely along a right line given in position; the other PM, which we call $y$, continually changing its position, but always parallel to itself; and moreover an equation only containing these two unknown quantities $x$ and $y$, mixed with known ones, which expresses the relation of every variable quantity AP ($x$) to its correspondent variable quantity PM ($y$): the line passing through the extremities of all the values of $y$, i. e. through all the points M, is called a geometrical locus, in general, and the locus of that equation in particular.

All equations, whose loci are of the first order, may be reduced to some one of the four following formulæ:

1. $y=\frac{bx}{a}$, 2. $y=\frac{bx}{a}+c$. 3. $y=\frac{bx}{a}-c$. 4. $y=c-\frac{bx}{a}$, where the unknown quantity $y$ is supposed always to be freed from fractions, and the fraction that multiplies the other unknown quantity $x$, to be reduced to this expression $\frac{b}{a}$, and all the known terms to this $c$.

The locus of the first formula being already determined; since it is evident, that it is a right line which cuts the axis in A, and which makes with it an angle, such that the two unknown quantities $x$, $y$, may be always to one another in the proportion of $a$ to $b$: to find that of the second, $y=\frac{bx}{a}+c$; in the line AP (Pl. 99. fig. 1.) take AB$=a$, and draw BE$=b$, AD$=c$, parallel to PM. On the same side AP, draw the line AE of an indefinite length towards E, and the indefinite strait line DM parallel to AE: the line DM is the locus of the aforesaid equation, or formula; for if the line MP be drawn from any point M thereof parallel to QA, the triangles ABE, APF, will be similar; and therefore AB ($a$): BE ($b$) : : AP ($x$): PF $=\frac{bx}{a}$; and consequently PM ($y$) $=$ PF $\left(\frac{bx}{a}\right)$ $+$ FM ($c$).

To find the locus of the third form, $y=\frac{bx}{a}-c$, proceed thus. Assume AB$=a$ (Pl. 99. fig. 2) and draw the right lines BE$=b$, AD$=c$, parallel to PM, the one on one side AP, and the other on the other side; and through the points A, E, draw the right line AE of an indefinite length towards E, and through the point D, the line DM parallel to AE: the indefinite right line GM shall be the locus sought; for we shall have always PM ($y$) $=$ PF $\left(\frac{bx}{a}\right)$ $-$FM ($c$).

Lastly, to find the locus of the fourth formula, $y=c-\frac{bx}{a}$; in AP (Pl. 99. fig. 3.) take AB$=a$, and draw BE$=b$, AD$=$C, parallel to PM, the one on one side AP, and the other on the other side; and through the points A, E, draw the line AE indefinitely towards E, and through the point D draw the line DM parallel to AE. Then DG shall be the locus sought; for if the line MP be drawn from any point M thereof, parallel to AQ; we shall have always PM ($y$) $=$ FM ($c$) $-$ PF $\left(\frac{bx}{a}\right)$.

Hence it appears, that all the loci of the first degree are strait lines; which may be easily found, because all their equations may be reduced to some one of the foregoing formulæ.

drantal figure, on board a ship, generally about a quarter of an inch thick, and five or six inches from the angular point to the circumference. It is balanced by a thin plate of lead, nailed upon the arch, or circular side, so as to swim perpendicularly in the water, with about two-thirds immersed under the surface. Hence we have the term *Log-line*, a little cord, or line, about an hundred and fifty fathoms long, fastened to the log, by means of two legs, one of which passes through a hole at the corner, and is knotted on the opposite side, while the other leg is attached to the arch by a pin fixed into another hole, so as to draw out occasionally. By these legs the log is hung in equilibrio; and the line thus annexed to it is wound round a reel fixed for that purpose in the gallery of the ship.

This line, from the distance of about ten, twelve, or fifteen fathoms off the log, has certain knots or divisions, which ought to be at least fifty feet from each other; though it was the common practice at sea, not to have them above 42 feet asunder.

The length of each knot ought to be the same part of a sea-mile as half a minute is of an hour; and admitting the measurement of Mr. Norwood, who makes a degree on a great circle of the earth to contain 367,200 English feet, or about $69\frac{1}{2}$ English statute miles, and, therefore, $\frac{1}{60}$th of it, or a nautical mile, will be 6120 feet; $\frac{1}{120}$th of 6120, or 51 feet, should be the length of each knot. But because it is safer to have the reckoning rather before the ship than after it, therefore 50 feet may be taken as the proper length of each knot. The knots are sometimes made to consist only of 42 feet each, even in the present practice; and this method of dividing the log-line was founded on the supposition that 60 miles, each of 5000 English feet, made a degree; for $\frac{1}{120}$ of 5000 is $41\frac{2}{3}$, or, in round numbers, 42 feet. Mariners, rather than quit the old way, though known to be erroneous, use glasses for half minute ones, that run but 24 or 25 seconds. They have also used a line of 45 feet to 30 seconds, or a glass of 28 seconds to 42 feet. When this is the case, the distance between the knots should be corrected by the following proportion: as 30 is to 50, so is the number of seconds of the glass to the distance between the knots upon the line. The heat or moisture of the weather has often a considerable effect upon the glass, so as to make it run slower or faster; it should, therefore, be frequently tried by the pendulum in the following manner. On a round nail hang a string that has a musket-ball fixed to one end, carefully measuring between the centre of the ball and the string's loop over the peg $39\frac{1}{5}$ inches, being the length of a second pendulum; then swing it, and count one for every time it passes under the peg, beginning at the second time it passes, and the number of swings made during the time the glass is running out, shews the seconds it contains. The line also is liable to relax and shrink, and should, therefore, be occasionally measured.

The use of the log and line is, to keep account, and make an estimate of the ship's way, or distance run; which is done by observing the length of line unwound in half a minute's time, told by a half-minute glass; for so many knots as run out in that time, so many miles the ship sails in an hour. Thus, if there be four knots veered out in half a minute, the ship is computed to run four miles an hour.

The author of this device for measuring the ship's way is not known; and no mention of it occurs till the year 1607, in an East-India voyage, published by Purchas; but from that time its name occurs in other voyages among his collections; and henceforward it became famous, being taken notice of both by our own authors and by foreigners; as by Gunter in 1623, Snellius in 1624, Metius in 1631, Oughtred in 1633, Herigone in 1634, Saltonstall in 1636, Norwood in 1637, Pournier in 1643, and almost by all the succeeding writers on navigation of every country.

*To Heave the Log.* The mariners throw it into the water on the lee-side, letting it run till it comes without the eddy of the ship's wake; then one, holding a half minute glass, turns it up just as the first knot, or the mark from which the knots begin to be reckoned, turns off the reel (fig. 2.) or passes over the stern. As soon as the glass is out, the reel is stopped, and the knots run off are told, and their parts estimated.

It is usual to heave the log once every hour in ships of war and East-Indiamen, and in all other vessels once in two hours; and if at any time of the watch the wind has increased or abated in the intervals, so as to effect the ship's velocity, the officer generally makes a suitable allowance for it at the close of the watch.

The log is a very precarious way of computing, and must always be corrected by experience and good sense; there being a great deal of uncertainty in the yawing of the ship going with the wind aft, or upon the quarter in the heaving of it, by its coming home, or being drawn after the ship on account of the friction of the reel and lightness of the log in the course of the current, and in the strength of the wind, which seldom keeps the same tenor for two hours together; which is the interval between the times of using the log in short voyages, though in longer ones they heave it every hour.

*Compound Log.* The above-mentioned errors, and particularly the log's being subject to drive with the motion which the water may have at its surface, whereas the experiment requires it to be fixed in the place where it is when the mark commenceing the knots goes off the reel, have been considered by writers; and many methods have been proposed to remove, or at least

to lessen them. The late M. Bouguer proposed a method, which has been thought deserving of particular attention, in the Mem. Acad. Sc. 1747; afterwards in his Treatise on Navigation, published at Paris in 1753, and since reprinted in 1760, by the abbé de la Caille. For this purpose, take for the log a conical piece of wood, which fix to the log-line passed through or along its axis, at about 40, 50, or 60, or more feet, from one end; and to this end fix the diver, which is a body formed of two equal square pieces of tin, or of thin iron plate, fixed at right angles to one another along their diagonals; and its size so fitted to that of the cone, that the whole may float. A cone of three inches diameter in the base, and of six inches in the slant height, is proposed by M. Bouguer to suit a diver made of plates about $9\frac{3}{4}$ inches square; the intersection of the diagonals is joined to the log-line, and the loop and peg fixed as in the common log. However, it has been found, that no kind of wood used in British dock-yards, when formed into a cone of the above dimensions, will float a diver made of stout tin plate, one side of the square being $9\frac{3}{4}$ inches. Such a diver weighing $1\frac{7}{8}$lb. averdupoise, required to float it a cone of five inches diameter and twelve inches on the slant side, so as the point of the cone, which was made of light fir, should just appear above the water. Now supposing one side of such a square tin diver to be about ten inches, and made of plates only two-thirds of the thickness of the former, such a diver would weigh, with its solder, about 20 ounces, and can be floated by a light fir cone of four-inches diameter in the base, and ten inches in the slant height or length; and such a compound log might perhaps be found on trial to be affected by about as much again as that proposed by M. Bouguer; and consequently the difference between the numbers given by the common log and compound log, must be augmented by two-thirds of itself for the necessary correction, as below. When the compound log of Bouguer, above described, is hove overboard, the diver will sink too deep to be much affected by the current or motion of water at the surface, and the log will thereby keep more steadily in the place where it first fell; and consequently the knots run off the reel will show more accurately the ship's rate of sailing. As the common log is affected by the whole motion of the current, so this compound log will feel only a part thereof, viz. such a part nearly as the resistance of the cone is to the resistance of the diver; then the resistances of the above cone and diver are about as 1 to 5; and consequently this log will drive but one fifth part of what the common log would do; and so the ship's true run will be affected by one-fifth only of the motion of the waters. To obtain the true rate of sailing, it will be proper to heave alternately, hour and hour, the common log and this compound log; then the difference of their knots run off, augmented by its one-fourth part, is the correction; which applied to the knots of the common log, will give the ship's true rate of sailing at the middle time between the hours when these logs were hove. The correction is additive when the compound log's run is the greatest, otherwise it is subtractive. To find the course made good, increase the observed angle between the log-lines by one fourth part; and this gives the correction to be applied to the apparent course, or the opposite of that shown by the common log; the correction is to be applied to the $\left\{\begin{array}{c}\text{right}\\ \text{left}\end{array}\right\}$ of the apparent course, when the bearing of the common log is to the $\left\{\begin{array}{c}\text{left}\\ \text{right}\end{array}\right\}$ of the compound log. Or thus; the lengths run off both legs, together with their bearings, being known; in a card or compass apply the knots run off, taken from a scale of equal parts along their respective bearings from the centre; join the ends; and in this line produced, on the side next the compound log's length, take one fourth of the interval; then a line drawn from the end, thus produced, to the centre of the card, will show the true course and distance made good. When a current, such as a tide, runs to any depth, the velocity of that current may be much better ascertained by the compound log than by the common one, provided the diver does not descend lower than the run of the current; for, as those ships which are deepest immerged drive fastest with the tide; so the diver, by being acted on below, as well as the log on the surface, their joint motion will give the total effect of the current's motion better than what could be derived from the motion at the surface only. Also, by such a compound log, the depth to which any current runs may be easily tried.

*Other Logs.* We have an account in the Voyage to the North Pole, p. 97, of two other logs, which were tried by Captain Phipps: one invented by Mr. Russel, the other by Foxon; both constructed upon this principle, that a spiral, in proceeding its own length in the direction of its axis through a resisting medium, makes one revolution round the axis: if, therefore, the revolutions of the spiral are registered, the number of times it has gone its own length through the water will be known. In both these the motion of the spiral in the water is communicated to the clock-work within board, by means of a small line fastened at one end to the spiral, which tows it after the ship, and at the other to a spindle, which sets the clock-work in motion. That invented by Mr. Russel has a half spiral of two threads, made of copper, and a small dial with clock-work, to register the number of turns of the spiral. The

other log has a whole spiral of wood with one thread, and a larger piece of clock-work with three dials, two of them to mark the distance, and the other divided into knots and fathoms, to show the rate by the half-minute glass, for the convenience of comparing it with the log. This kind of log will have the advantage of every other in smooth water and moderate weather; and it will be useful in finding the trim of a ship when alone, in surveying a coast in a single ship, or in measuring distances in a boat between head-lands and shoals; but it is subject to other inconveniences, which will not render it a proper substitute for the common log.

*Perpetual Log.* A machine so called by its inventor, Mr. Gottlieb of Houndsditch, London. It is intended by it to keep a constant and regular account of the rate of the ship's velocity through the water; whereas the common log hitherto used does not indicate the variation in her velocity in the interval of heaving the log, and consequently does not ascertain the true distance that the ship has run in any given length of time.

Fig. 1. pl. 100, is a representation of the whole machine; the lower part of which, EFG, is fixed to the side of the keel; H representing only the boundary line of the ship's figure. EF are the section of a wooden external case, left open at the ends KL, to admit the passage of the water during the motion of the ship. At M is a copper grating, placed to obstruct the entrance of any dirt, &c. into the machine. I, is a section of a water-wheel, made from 6 to 12 inches in diameter, as may be necessary, with float-boards upon its circumference, like a common water-wheel, that turn by the resistance of the water passing through the channel LK. It turns upon a shouldered axis, represented by the vertical section at K. When the ship is in motion, the resistance of the water through the channel LK turns round the wheel I. This wheel, by means of a pinion, is connected with and turns the rod contained in the long copper tube N. This rod, by a pinion fixed at its upper extremity, is connected with and turns upon the whole system of wheels contained in the dial of the case ABCD. This dial, by means of the copper tube N, may be fixed to any convenient place aboard the ship. In the front of the dial are several useful circular graduations, as follow: The reference by the dotted line A has an hand which is moved by the wheels within, which points out the motion of the ship in fathoms of 6 feet each. The circle at B has an hand showing the knots, at the rate of 48 feet for each knot; and is to be observed with the half-minute glass at any time. The circle at C has a short and a long hand; the former of which points out the miles in land measure, and the latter or longer the number of knots contained in each mile, viz. 128, which is in the same proportion to a mile as 60 minutes to the hour in the reckoning. At *e*, a small portion of a circle is seen through the front-plate called the register; which shows, in the course of 24 hours (if the ship is upon one tack), the distance in miles that she has run; and in the 24 hours the mariner need take but one observation, as this register serves as an useful check upon the fathoms, knots, and miles, shown upon the two other circles. *f*, Is a plate showing 100 degrees or 6000 miles, and also acts as another register or check; and is useful in case of any mistake being made in observing the distance run by the other circles. The reckoning by these circles, without fear of mistake, may therefore be continued to nearly 12,000 miles. A communication from this machine may easily be made to the captain's bed-side, where by touching a spring only, a bell in the head ABCD will sound as many times in an half minute as the ship sails miles in an hour.

Mr. Saumarez, invented a marine surveyor; which was a revolving Y fixed to a rope as an axis, and making a turn in every 10 feet. This was described in Phil. Trans. for 1725. In a further account of the marine surveyor, giving in the Phil. Trans. for 1729, the inventor proposed sometimes substituting a wheel with oblique float-boards, for the fly or Y.

Smeaton, in Phil. Trans. 1754, proposed a method by means of a revolving plate.

Mr. Hamilton, substitutes for a log, a reservoir with an orifice constantly discharging. Repertory of Arts, I. 355, second series.

Mr. Hamill, in Nicholson's Journal, No. 58, on the principle suggested by Captain Hamilton, proposes a variation in the use of an instrument for measuring a ship's way, which he states, on the authority of Gregory's Mechanics, to have been the contrivance of M. Pitot. The instrument consists of two tubes, one with a trumpet mouth turned forwards to face the impulse of the water, the other rising vertically from the bottom. The difference of the height of water in these two tubes it was supposed would denote the velocity of the ship.

Mr. Hamill observes that the fluctuation of the sea would render the rise of the water in the tubes undulatory and irregular and to remedy this defect, proposes that the orifice of the trumpet tube within the ship shall be on a level with the water, and have a receiver annexed to it to catch the water, which will run over from it when the ship is under way; by the quantity of the water flowing into the receiver in a given time, and through a given aperture, Mr. Hamill supposes the velocity of the vessel may be better ascertained than by the method of M. Pitot.

M. Le Guin invented a new log which a few years ago was described in the *Annales des Arts*, as follows:

The new log, fig. 2. pl. 100 being fastened to the stern of the ship by the cord 1, at a proper distance, the shock of the water causes the screw 2 to turn round on its axis. On the stem of this axle is a screw, which sets in motion the machinery 3, 4, 5, and 6, constructed in such a manner that while the great wheel makes one turn the endless screw 2 makes 240,000, and the number of turns of the endless screw is indicated by a needle on the wheel 6. This wheel has a 100 cogs, the wheel 4 has 40, and 3 has 60.

From these statements this log may be made of the same proportion, and tried. Those who make trial of it at sea must take it out of the water when the vessel has proceeded one league; they must examine to what number the index of the great wheel points, which will certainly not have made one turn. This number they must note down, and, to ascertain the utility of the log, they should repeat their experiments both in moderate winds and heavy gales.

Supposing at the end of a league that the index points to 88 with a moderate wind, and to 76 with a high wind, it will be easy to find the mean of this equation, and to confirm, by a calculation, or by this measure of the ship's way, the distance she has proceeded.

M. Le Guin made an experiment of about 100 leagues with his log: the wheel No. 6 gave 20 cogs per league, and 19 with moderate winds.

This log is intirely constructed of copper.

Mr. J. W. Boswell, proposed in 1807, a method of ascertaining the velocity of a ship under sail, founded upon the proportion subsisting between the resistance experienced by a body moving through a fluid, and the velocity of its motion, the former being as the square of the latter. Hence let a common log, or instead of it an instrument formed of a stick like a walking stick with four or more sheaves attached to it at about a foot from each other, or instead of the sheaves any flat pieces of board similarly posited, be thrown into the water and drawn after the ship by a cord, attached to a spring steelyard (or other suitable weighing apparatus) fixed at or near the centre of the oscillatory motions of a ship; then will the scale of the weighing instrument so fixed indicate changes that vary as the square of the velocity of the vessel, or of the implement drawn after it.

The actual weight corresponding to some assumed velocity of the ship's motion is to be ascertained by a series of experiments, in which the log might be used; and then tables may be readily computed for the particular apparatus adopted, by which any other velocity may be determined from the weight on the steelyard, &c. by inspection. And as the resistance of the floating implement may be varied at pleasure by altering the size of the disks, it is recommended to modify it so as to raise a square number of ounces in the standard experiment, since that expedient will facilitate the computation of the table.

The line let out must be so long that the instrument may not be irregularly affected by the motion of the waves; and the accuracy of the whole will be increased by wetting the line before it is thrown out. The original length of line in the standard experiment must of course be retained.

General Grant (Viscount de Vaux) has contrived an instrument called a Hydroscope, similar in principle to Mr. Boswell's; the chief difference in the application being that the general purposes to attach *globes* to a flexible chain; and ascertain the relations of the velocity by means of those of the resistance experienced by the globes. This method, however, as well as Mr. Boswell's is open to many objections, which we have not room to specify here.

Those who wish to learn more respecting various other contrivances for the same purpose, may consult Montucla, *Histoire des Mathématiques*, tom. iv. 525—537.

LOG BOARD, a table generally divided into five columns, in the first of which is entered the hour of the day; in the second, the course steered; in the third, the number of knots run off the reel each time of heaving the log; in the fourth, from what point the wind blows; and in the fifth, observations on the weather, variation of the compass, &c.

LOG BOOK, a book ruled in columns like the log-board, into which the account on the log-board is transcribed every day at noon; from whence, after it is corrected, &c. it is entered into the journal.

LOG WOOD, in the arts, is derived from a low prickly tree, which is found in great plenty at Campeachy, in the bay of Hon duras, and is denominated "hæmatoxylon campechianum." It comes to Europe in large logs, cleared from the bark, and is very hard, compact, heavy, and of a red colour. It is in high request among dyers, especially in dying black. It gives out the colour both to water and alcohol; the liquor at first assumes a fine red colour with a shade of purple. The infusion becomes gradually deeper, and at last almost black. To cloth previously boiled in alum and tartar, it gives a beautiful violet colour, which, however, will not stand. Alkalies render the colour darker, acids change it to yellow. From a variety of experiments it is found that the colouring matter of logwood bears in many respects a strong analogy to tannin, but in others it differs from it. See LIGNUM CAMPECHENSE.

LOGARITHMS, formed from the Greek λογος, *ratio*, and αριθμος, *number*; q. d. *ratio of numbers*, or perhaps, rather *number of*

*ratios*; the indices of the ratios of numbers one to another; or a series of artificial numbers proceeding in arithmetical proportion, corresponding to as many others proceeding in geometrical proportion; contrived for the easing and expediting of calculation.

LOGARITHMS have been usually defined *numerorum proportionalium æquidifferentes comites*; but this definition Dr. Halley and Stifelius think deficient, and more accurately define them, *the indices or exponents of the ratios of numbers*; ratio being considered as a quantity *sui generis*, beginning from the ratio of equality, or 1 to 1 = o; and being affirmative when the ratio is increasing, and negative when it is decreasing.

The Logarithm of any given number, is the index of such a power of some other number, as is equal to the given one. So if N be $= r^n$, then the Logarithm of N is $n$, which may be either positive or negative, and $r$ any number whatever, according to the different systems of Logarithms. When N is 1, then $n$ is = o, whatever the value of $r$ is; and consequently the Logarithm of 1 is always o in every system of Logarithms. When $n$ is = 1, then N is $= r$; consequently the base or root $r$ is always the number whose Logarithm is 1, in every system. When $r$ is = 2·718281828459 &c. the indices are the hyperbolic Logarithms; so that $n$ is always the hyperbolic Logarithm of $\overline{2{\cdot}718\ \&c)}^n$. But in the common Logarithms, $r$ is = 10; so that the common Logarithm of any number, is the index of that power of 10 which is equal to the said number; so the common Logarithm of $N = 10^n$, is $n$ the index of the power of 10; for example, 1000, being the 3d power of 10, has 3 for its Logarithm; and if 50 be $= 10^{1{\cdot}69897}$, then is 1·69897 the common Logarithm of 50. And hence it follows that this decimal series of terms,

1000, 100, 10, 1, ·1, ·01, ·001, or

$10^3$, $10^2$, $10^1$, $10^0$, $10^{-1}$, $10^{-2}$, $10^{-3}$,

have 3, 2, 1, 0, −1, −2, −3, respectively for the Logarithms of those terms.

The Logarithm of a number contained between any two terms of the first series, is included between the two corresponding terms of the latter; and therefore that Logarithm will consist of the same index, whether positive or negative, as the smaller of those two terms, together with a decimal fraction, which will always be positive. So the number 50 falling between 10 and 100, its Logarithm will fall between 1 and 2, being indeed equal to 1·69897 nearly: also the number ·05 falling between the terms ·1 and ·01, its Logarithm will fall between − 1 and − 2, and is indeed = −2 + ·69897, the index of the less term together with the decimal ·69897. The index is also called the Characteristic of the Logarithms, and is always an integer, either positive or negative, or else = o; and it shews what place is occupied by the first significant figure of the given number, either above or below the place of units, being in the former case + or positive; in the latter − or negative.

When the characteristic of a Logarithm is negative, the sign − is commonly set over it, to distinguish it from the decimal part, which, being the Logarithm found in the tables, is always positive: so − 2 + ·69897, or the Logarithm of ·05, is written thus $\bar{2}{\cdot}69897$. But on some occasions it is convenient to reduce the whole expression to a negative form; which is done by making the characteristic less by 1, and taking the arithmetical complement of the decimal, that is, beginning at the left hand, substract each figure from 9, except the last significant figure, which is substracted from 10; so shall the remainders form the Logarithm wholly negative: thus the Logarithm of ·05, which is $\bar{2}{\cdot}69897$ or − 2 + ·69897, is also expressed by −1·30103, which is all negative. It is also sometimes thought more convenient to express such Logarithms entirely as positive, namely by only joining to the tabular decimal the complement of the index to 10; and in this way the above Logarithm is expressed by 8·69897; which is only increasing the indices in the scale by 10.

*The Properties of Logarithms.*—From the definition of Logarithms, either as being the indices of a series of geometricals, or as the indices of the powers of the same root, it follows that the multiplication of the numbers will answer to the addition of their Logarithms; the division of numbers, to the substraction of their Logarithms; the raising of powers, to the multiplying the Logarithm of the root by the index of the power; and the extracting of roots, to the dividing the Logarithm of the given number by the index of the root required to be extracted.

So, 1st,

Log. $ab$ or of $a \times b$ is = log. $a$ + log. $b$,
Log. 18 or of 3 × 6 is = log. 3 + log. 6,
Log. 5 × 9 × 73 is = log. 5 + log. 9 + log. 73.

Secondly,

Log. $a \div b$ is = log. $a$ − log. $b$,
Log. 18 ÷ 6 is = log. 18 − log. 6,
Log. 79 × 5 ÷ 9 is = log. 79 + log. 5 − log. 9,
Log. $\frac{1}{2}$ or 1 ÷ 2 is = l. 1 − l. 2 = o − l. 2 = − l. 2,

Log. $\frac{1}{n}$ or $1 \div n$ is = l. 1 − l. $n$ = − l. $n$.

Thirdly,

Log. $r^n$ is = $n$ l. $r$; Log. $r^{\frac{1}{n}}$ or of $\sqrt[n]{r}$ is = $\frac{1}{n}$ l. $r$;

Log. $r^{\frac{m}{n}}$ is $=\frac{m}{n}$l. $r$; Log. $2^6$ is $=6$l. 2; log. $2^{\frac{1}{3}}$ or of $\sqrt[3]{2}$ is $=\frac{1}{3}$l. 2; and Log. $2^{\frac{3}{5}}$ is $=\frac{3}{5}$ l. 2.

So that any number and its reciprocal have the same Logarithm, but with contrary signs; and the sum of the Logarithms of any number and its reciprocal or complement, is equal to o.

To be a little more particular—

Let us suppose that the number $r$ greater than unity, is the base of a system of logarithms, and let there be given to it the variable exponent $p$ in such manner that the expression $r^p$ shall represent all possible numbers, by attributing successively different values to the exponent $p$. It is manifest

1. That the logarithm of unity will be always *zero*, whatever be the base $r$: for, in general $r^0=1$.

2. That the logarithm of the base $r$ will be 1, since $r$ is the same thing as $r^1$.

3. That all numbers above 1 will have positive numbers for their logarithms. Thus, supposing $r=10$, then the number 10000, or $10^3$, has for its logarithm the positive number 4.

4. All fractions, or numbers below unity, have negative numbers for their logarithms. Thus if $r=10$, then $\frac{1}{10000}$, or ·0001, or $10^{-4}$, has $-4$ for its logarithm.

5. Having two numbers N and N′, to which correspond respectively the two logarithms $p$ and $p'$, to the same base or root $r$: we have $N=r^p$, and $N'=r^{p'}$, and consequently, $N\times N'=r^p\times r^{p'}=r^{p\times p'}$. Whence it appears that in every system of logarithms, the logarithm $p+p'$ of a product NN′ composed of two factors, is equal to the sum of the logarithm of those factors.

6. If we have any numbers A, B, C, D, how many soever, we shall (using the initial $\lambda$ to denote the logarithm), have $\lambda.(A\times B\times C\times D)=\lambda.A+\lambda.B+\lambda.C+\lambda.D$:

For, supposing $A\times B=N$; we shall have $\lambda.(A\times B\times C\times D)=\lambda.(N\times C\times D)$. Let also, $N\times C=N.'$ then $\lambda.(A\times B\times C\times D)=\lambda.(N'\times D)=\lambda.N'+\lambda.D$. But, $\lambda.N'=\lambda.(N\times C)=\lambda.N+\lambda.C$, and $\lambda.N=\lambda.(A\times B)=\lambda.A+\lambda.B$. Therefore, $\lambda.(A\times B\times C\times D)=\lambda.A\times\lambda.B\times\lambda.C\times\lambda.D$. Hence, the logarithm of the product of any number of factors whatever, is equal to the sum of the logarithms of these factors.

7. If $A=B=C=D$, we shall have $\lambda.(A\times A\times A\times A)$, or $\lambda.A^4=\lambda.A+\lambda.A+\lambda.A+\lambda.A=4\lambda.A$:

and in general $\lambda.A^n=n\lambda.A$. Thus, we see that the logarithm of any integral positive power, $n$, of a number A is equal to $n$ times the logarithm of A.

8. We have also $\lambda.A^{\frac{n}{p}}=\frac{n}{p}\lambda.A$ ($n$ and $p$ being positive integers). For, let $A^{\frac{n}{p}}=K$, and consequently, $\lambda.^{\frac{n}{p}}=\lambda.K$. From the equation $A^{\frac{n}{p}}=K$, we have, by raising the whole to the power $p$, $A^n=K^p$; and, of consequence, $n\lambda.A=p\lambda.K$, or, by division, $\frac{n}{p}\lambda.A=\lambda.K=\lambda.A^{\frac{n}{p}}$.

9. From the same principle it follows that $\lambda.\frac{A}{B}=\lambda.A-\lambda.B$.

For, let $\frac{A}{B}=Q$, and consequently $A=B\times Q$: we shall then have $\lambda.A=\lambda.B+\lambda.Q$; whence $\lambda.Q=\lambda.A-\lambda.B$. So that, the logarithm of the quotient is equal to the logarithm of the dividend minus that of the divisor; or the logarithm of a fraction is equal to the logarithm of the numerator made less by that of the denominator.

10. Also, $\lambda.A^{-n}=-n\lambda.A$: for $A^{-n}=\frac{1}{A^n}$; therefore $\lambda.A^{-n}=\lambda.1-\lambda.A^n=0-n\lambda.A$; which is no other than $-n\lambda.A$.

11. Again, $\lambda.A^{-\frac{n}{p}}=-\frac{n}{p}\lambda.A$: for $A^{-\frac{n}{p}}=\frac{1}{\frac{n}{p}}$; whence results $\lambda.A^{-\frac{n}{p}}=0-\frac{n}{p}\lambda.A=-\frac{n}{p}\lambda.A$.

12. Suppose there be two systems of logarithms whose roots or bases are $r$ and $s$. Let any number N have $p$ for its logarithm in the first system, and $q$ for its logarithm in the second: we shall have $N=r^p$, and $N=s^q$, which gives $r^p=s^q$, and $s=r^{\frac{p}{q}}$. Therefore, taking the logarithms for the system $r$, we shall have $\lambda.s=\frac{p}{q}\lambda.r$; or, if in the system $r$ we have $\lambda.r=1$, then $\lambda.s=\frac{p}{q}$, or $q=\frac{p}{\lambda.s}=p\times\frac{1}{\lambda.s}$. Thus, knowing the logarithm $p$ of any number N, for the system whose base is $r$, we may obtain the logarithm $q$ of the same number for the system $s$, by multiplying $p$ by a fraction whose numerator is unity and denominator the logarithm of $s$ taken in the system $r$.

*History and Construction of Logarithms.*—The properties of logarithms hitherto mentioned, or of arithmetical indices to powers or geometricals, with their various

uses and properties, as above-mentioned, are taken notice of by Stifelius, in his Arithmetic; and indeed they were not unknown to the ancients; but they come all far short of the use of logarithms in trigonometry, as first discovered by John Napier, baron of Merchiston in Scotland, and published at Edinburgh in 1614, in his Mirifici Logarithmorum Canonis Descriptio; which contained a large canon of logarithms, with the description and uses of them; but their construction was reserved till the sense of the learned concerning his invention should be known. This work was translated into English by the celebrated Mr. Edward Wright, and published by his son in 1616. In the year 1619, Robert Napier, son of the inventor of logarithms, published a new edition of his late father's work, together with the promised Construction of the Logarithms, with other miscellaneous pieces written by his father and Mr. Briggs. In the same year, 1619, Mr. John Speidell published his New Logarithms, being an improved form of Napier's.

All these tables were of the kind that have since been called hyperbolical, because the numbers express the areas between the asymptote and curve of the hyperbola. And logarithms of this kind were also soon after published by several other persons; as by Ursinus in 1619, Kepler in 1624, and some others.

On the first publication of Napier's logarithms, Henry Briggs, then professor of geometry in Gresham College in London, immediately applied himself to the study and improvement of them, and soon published the logarithms of the first 1000 numbers, but on a new scale, which he had invented, viz. in which the logarithm of the ratio of 10 to 1 is 1, the logarithm of the same ratio in Napier's system being 2·30258, &c.; and in 1624, Briggs published his Arithmetica Logarithmica, containing the logarithms of 30,000 natural numbers, to 14 places of figures besides the index, in a form which Napier and he had agreed upon together, which is the present form of logarithms; also in 1633 was published, to the same extent of figures, his Trigonometria Britannica, containing the natural and logarithmic sines, tangents, &c.

With various and gradual improvements, logarithms were also published successively, by Gunter, in 1620; Wingate, in 1624; Henrion, in 1626; Miller and Norwood, in 1631; Cavalerius, in 1633 and 1643; Vlacq and Rowe, in 1633; Frobenius, in 1634; Newton, in 1658, Caramuel in 1670; Sherwin, in 1706; Gardiner, in 1742; and Dodson's Antilogarithmic Canon in the same year: besides many others of less note.

In Napier's construction of logarithms, the natural numbers, and their logarithms, as he sometimes called them, or at other times the artificial numbers, are supposed to arise, or to be generated, by the motions of points, describing two lines, of which the one is the natural number, and the other its logarithm, or artificial. Thus, he conceived the line or length of the radius to be described, or run over, by a point moving along it in such a manner, that in equal portions of time it generated, or cut off, parts in a decreasing geometrical progression, leaving the several remainders, or sines, in geometrical progression also; whilst another point described equal parts of an indefinite line, in the same equal portions of time; so that the respective sums of these, or the whole line generated, were always the arithmeticals or logarithms of the aforesaid natural sines. In this idea of the generation of the logarithms and numbers, Napier assumed 0 as the Logarithm of the greatest sine or radius; and next he limited his system, not by assuming a particular value to some assigned number, or part of the radius, but by supposing that the two generating points, which, by their motions along the two lines, described the natural numbers and logarithms, should have their velocities equal at the beginning of those lines. And this is the reason that, in his table, the natural sines and their logarithms, at the complete quadrant, have equal differences or increments; and this is also the reason why his scale of logarithms happens accidentally to agree with what have since been called the hyperbolical logarithms, which have likewise numeral differences equal to those of their natural numbers at the beginning; except only that these latter increase with the natural numbers, while his on the contrary decrease; the logarithm of the ratio of 10 to 1 being the same in both, namely 2·30258509, &c.

Having thus limited his system, Napier proceeds, in the posthumous work of 1619, to explain his construction of the logarithmic canon. This he effects in various ways, but chiefly by generating, in a very easy manner, a series of proportional numbers, and their arithmeticals or logarithms; and then finding, by proportion, the logarithms to the natural sines from those of the natural numbers, among the original proportionals; a particular account of which may be seen in my book of logarithms above mentioned.

The methods above alluded to, relate to Napier's or to what have been usually called the hyperbolical system of logarithms, and indeed are in a manner peculiar to that kind. But in an appendix to the posthumous work, mention is made of other methods, by which the common logarithms, agreed upon by him and Briggs, may be constructed, and which it appears were written after that agreement. One of these methods is as follows: having assumed 0 for the logarithm of 1, and 1000 &c. for the logarithm of 10; this logarithm of 10, and the successive

quotients are to be divided ten times by 5, by which divisions there will be obtained these other ten logarithms, namely 2000000000, 400000000, 80000000, 16000000, 3200000, 640000, 128000, 25600, 5120, 1024; then this last logarithm, and its quotients, being divided ten times by 2, will give these other ten logarithms,

viz. 512, 256, 128, 64, 32, 16, 8, 4, 21.

And the numbers answering to these twenty logarithms are to be found in this manner, viz. Extract the 5th root of 10 (with ciphers), then the 5th root of that root, and so on for ten continual extractions of the 5th root: so shall these 10 roots be the natural numbers belonging to the first ten logarithms above found, in dividing continually by 5. Next, out of the last 5th root is to be extracted the square root, then the square root of this last root, and so on for 10 successive extractions of the square root: so shall these last ten roots be the natural numbers corresponding to the logarithms or quotients arising from the last ten divisions by the number 2. From these twenty logarithms, 1, 2, 4, 8, &c. and their natural numbers, the author observes that other logarithms and their numbers may be formed, namely by adding the logarithms, and multiplying their corresponding numbers. But, besides the immense labour of this method, it is evident that this process would generate rather an antilogarithmic canon, such as Dodson's, than the table of Briggs.

Napier next mentions another method of deriving a few of the primitive numbers and their logarithms, namely, by taking continually geometrical means, first between 10 and 1, then between 10 and this mean, and again between 10 and the last mean, and so on; then taking the arithmetical means between their corresponding logarithms.

He then lays down various relations between numbers and their logarithms, such as, that the products and quotients of numbers, answer to the sums and differences of their logarithms; and that the powers and roots of numbers, answer to the products and quotients of the Logarithms when multiplied or divided by the index of the power or root, &c.; as also that, of any two numbers, whose logarithms are given, if each number be raised to the power denoted by the logarithm of the other, the two results will be equal; thus, if $x$ be the logarithm of any number X, and $y$ the logarithm of Y, then is $X^y = Y^x$. Napier then adverts to another method of making the logarithms to a few of the prime integer numbers, which is well adapted to the construction of the common table of logarithms: this method easily follows from what has been said above, and it depends on this property, that the logarithm of any number in this scale, is one less than the number of places or figures contained in that power of the given number whose exponent is 10000000000, or the logarithm of 10, at least as to integer numbers, for they really differ by a fraction, as is shewn by Mr. Briggs in his illustrations of these properties; printed at the end of his appendix to the Construction of Logarithms.

Kepler gave a construction of logarithms somewhat varied from Napier's. His work is divided into two parts: in the first, he raises a regular and purely mathematical system of proportions, and the measures of them, demonstrating both the nature and principles of the construction of logarithms, which he calls the measures of ratios: and in the second part, he applies those principles in the actual construction of his table, which contains only 1000 numbers and their logarithms. The fundamental principles are briefly these: that at the beginning of the logarithms, their increments or differences are equal to those of the natural numbers: that the natural numbers may be considered as the decreasing cosines of increasing arcs: and that the secants of those arcs at the beginning have the same differences as the cosines, and therefore the same differences as the logarithms. Then, since the secants are the reciprocals of the cosines of the same arcs, from the foregoing principles, he establishes the following method of raising the first 100 logarithms, to the number 1000, 999, 998, &c. to 900; viz. in this manner: divide the radius 1000, increased with seven ciphers, by each of these numbers separately, and the quotients will be the secants of those arcs which have the divisors for their cosines; continuing the division to the 8th figure, as it is in that place, only that the arithmetical and geometrical means differ. Then by adding continually the arithmetical means between every two successive secants, the sums will be the series of logarithms. Or by adding continually every two secants, the successive sums will be the series of the double logarithms. He then derives all the other logarithms from the first 100, by common principles.

Briggs first adverts to the methods mentioned above, in the appendix to Napier's Construction, which methods were common to both these author's, and had doubtless been jointly agreed upon by them. He gives an example of computing a logarithm by the property, that the logarithm is one less than the number of places or figures contained in that power of the given number whose exponent is the logarithm of 10 with ciphers. Briggs next treats of the other general method of finding the logarithms of prime numbers, which he thinks is an easier way than the former, at least when many figures are required. This method consists in taking a great number of continued geometrical means between 1 and the given number whose logarithm is required; that is, first extracting the square root of the given number, then the root of the 1st root, the root of the 2d root, the root of the 3d

root, and so on, till the last root shall exceed 1 by a very small decimal, greater or less, according to the intended number of places to be in the logarithm sought: then finding the logarithm of this small number, by easy methods described afterwards, he doubles it as often as he made extractions of the square root, or, which is the same thing, he multiplies it by such power of 2 as is denoted by the said number of extractions, and the result is the required logarithm of the given number; as is evident from the nature of logarithms.

But as the extraction of so many roots is a very troublesome operation, our author devises some ingenious contrivances to abridge that labour, chiefly by a proper application of the several orders of the differences of numbers, forming the first instance of what may be called the differential method; but for a particular description of these methods, see HUTTON's *Logarithms*.

Mr. James Gregory, in his Vera Circuli Hyperbolæ Quadratura, printed at Padua in 1667, having approximated to the hyperbolic asymptotic spaces by means of a series of inscribed and circumscribed polygons, from thence shews how to compute the logarithms, which are analogous to the areas of those spaces: and thus the quadrature of the hyperbolic spaces became the same thing as the computation of the logarithms. He here also lays down various methods of abridging the computation, with the assistance of some properties of numbers themselves, by which the logarithms of all prime numbers under 1000 may be computed, each by one multiplication, two divisions, and the extraction of the square root. The same subject is farther pursued in his Exercitationes Geometricæ. In this latter place, he first finds an algebraic expression, in an infinite series, for the logarithm of $\frac{1+a}{1}$, and then the like for the logarithm of $\frac{1}{1-a}$; and as the one series has all its terms positive, while those of the other are alternately positive and negative, by adding the two together, every 2d term is cancelled, and the double of the other terms gives the logarithm of the product of $\frac{1+a}{1}$ and $\frac{1}{1-a}$, or the logarithm of $\frac{1+a}{1-a}$, that is of the ratio of $1-a$ to $1+a$: thus, he finds, first $a-\frac{1}{2}a^2+\frac{1}{3}a^3-\frac{1}{4}a^4$ &c. = log. of $\frac{1+a}{1}$ and $a+\frac{1}{2}a^2+\frac{1}{3}a^3+\frac{1}{4}a^4$ &c. = log. of $\frac{1}{1-a}$, theref. $2a+\frac{2}{3}a^3+\frac{2}{5}a^5+\frac{2}{7}a^7$ &c. = l. of $\frac{1+a}{1-a}$,

Which may be accounted by Mr. James Gregory's method of making logarithms.

In 1668, Nicholas Mercator published his Logarithmotechnia, sive Methodus Construendi Logarithmos, nova, accurata, et facilis; in which he delivers a new and ingenious method for computing the logarithms upon principles purely arithmetical; and here, in his modes of thinking and expression, he closely follows the celebrated Kepler, in his writings on the same subject; accounting logarithms as the measures of ratios, or as the number of ratiunculæ contained in the ratio which any number bears to unity. Purely from these principles, then, the number of the equal ratiunculæ contained in some one ratio, as of 10 to 1, being supposed given, our author shews how the logarithm, or measure, of any other ratio may be found. But this, however, only by-the-bye, as not being the principal method he intends to teach, as his last and best. Having shewn that these logarithms, or numbers of small ratios, or measures of ratios, may be all properly represented by numbers, and that of 1, or the ratio of equality, the logarithm or measure being always 0, the logarithm of 10, or the measure of the ratio of 10 to 1, is most conveniently represented by 1 with any number of ciphers; he then proceeds to shew how the measures of all other ratios may be found from this last supposition: and he explains these principles by some examples in numbers.

In the latter part of the work, Mercator treats of his other method, given by an infinite series of algebraic terms, which are collected in numbers by common addition only. He here squares the hyperbola, and finally finds that the hyperbolic logarithm of $1+a$, is equal to the infinite series $a-\frac{1}{2}a^2+\frac{1}{3}a^3-\frac{1}{4}a^4$ &c.; which may be considered as Mercator's quadrature of the hyperbola, or his general expression of an hyperbolic logarithm, in an infinite series.

This method was farther improved by Dr. Wallis, in the Philos. Trans. for the year 1668. The celebrated Newton invented also the same series for the quadrature of the hyperbola, and the construction of logarithms, and that before the same were given by Gregory and Mercator, though unknown to one another, as appears by his letter to Mr. Oldenburg, dated October 24, 1676. The explanation and construction of the logarithms are also further pursued in his Fluxions, published in 1736, by Mr. Colson.

Dr. Halley in the Philos. Trans. for the year 1695, gave a very ingenious essay on the construction of logarithms, entitled, "A most compendious and facile Method for constructing the Logarithms, and exemplified and demonstrated from the nature of numbers, without any regard to the hyperbola, with a speedy method for finding the number from the given logarithm."

Instead of the more ordinary definition of logarithms, viz, 'numerorum proportionalium æquidifferentes comites,' the learned author adopts this other, 'numeri rationum

exponentes,' as better adapted to the principle on which logarithms are here constructed, considering them as the number of ratiunculæ contained in the given ratios whose logarithms are in question. In this way he first arrives at the logarithmic series before given by Newton and others, and afterwards, by various combinations and sections of the ratios, he derives others, converging still faster than the former. Thus he found the logarithms of several ratios as below, viz. when multiplied by the modulus peculiar to the scale of logarithms.

$q - \frac{1}{2}q^2 + \frac{1}{3}q^3 - \frac{1}{4}q^4$ &c. the log. of 1 to $1 + q$,

$q + \frac{1}{2}q^2 + \frac{1}{3}q^3 + \frac{1}{4}q^4$ &c. the log. of 1 to $1 - q$,

$\frac{x}{a} - \frac{x^2}{2a^2} + \frac{x^3}{3a^3} - \frac{x^4}{4a^4}$ &c. the log. of $a$ to $b$, or

$\frac{x}{b} + \frac{x^2}{2b^2} + \frac{x^3}{3b^3} + \frac{x^4}{4b^4}$ &c. the same log. of $a$ to $b$, or

$\frac{2x}{z} + \frac{2x^3}{3z^3} + \frac{2x^5}{5z^5} + \frac{2x^7}{7z^7}$ &c. the same log. of $a$ to $b$,

$\frac{x^2}{2z^2} + \frac{x^4}{4z^4} + \frac{x^6}{6z^6} + \frac{x^8}{8z^8}$ &c. the log. of $\sqrt{ab}$ to $\frac{1}{2}z$, or

$\frac{1}{y^2} + \frac{1}{3y^6} + \frac{1}{5y^{10}} + \frac{1}{7y^{14}}$ &c. the same log. of $\sqrt{ab}$ to $\frac{1}{2}z$; where $a$, $b$, $q$, are any quantities, and the values of $x$, $y$, $z$, are thus, viz. $x = b - a$, $z = b + a$, $y = ab + \frac{1}{4}{}^2$.

Dr. Halley also, first of any performed the reverse of the problem, by assigning the number to a given logarithm; viz.

$$\frac{b}{a} = 1 + l + \frac{1}{2}l^2 + \frac{1}{2.3}l^3 + \frac{1}{2.3.4}l^4 \text{ \&c, or}$$

$$\frac{a}{b} = 1 - l + \frac{1}{2}l^2 - \frac{1}{2.3}l^3 + \frac{1}{2.3.4}l^4 \text{ \&c.}$$

where $l$ is the logarithm of the ratio of $a$ the less, to $b$ the greater of any two terms.

Mr. Abraham Sharp of Yorkshire made many calculations and improvements in logarithms, &c. The most remarkable of these were, his quadrature of the circle to 72 places of figures, and his computation of logarithms to 61 figures, viz. for all numbers to 100, and for all prime numbers to 1100.

The celebrated Roger Cotes gave to the world a learned tract on the nature and construction of logarithms: this was first printed in the Philos. Trans. No. 338, and afterwards with his Harmonia Mensurarum in 1722, under the title Logometria. This tract has justly been complained of, as very obscure and intricate; but the principle is something between that of Kepler and the method of fluxions. He invented the terms modulus and Modular ratio, this being the ratio

of $1 + \frac{1}{1} + \frac{1}{2} + \frac{1}{2.3} + \frac{1}{2.3.4} + \frac{1}{2.3.4.5}$ &c. to 1 or of 1 to $1 - \frac{1}{1} + \frac{1}{2} - \frac{1}{2.3} + \frac{1}{2.3.4} - \frac{1}{2.3.4.5}$ &c.; that is the ratio of 2.718281828459 &c. to 1, or the ratio of 1 to 0.367879441171 &c.; the modulus of any system being the measure or logarithm of that ratio, which in the hyperbolic logarithms is 1, and in Briggs's or the common logarithms is 0.434294481903 &c.

The learned Dr. Brook Taylor gave another method of computing logarithms in the Philos. Trans. No. 352, which is founded on these three principles, viz. 1st, That the sum of the logarithms of any two numbers is the logarithm of the product of those numbers; 2d, That the logarithm of 1 is 0, and consequently that the nearer any number is to 1, the nearer will its logarithm be to 0; 3d, That the product of two numbers or factors, of which the one is greater and the other less than 1, is nearer to 1, than that factor is which is on the same side of 1 with itself; so of the two numbers $\frac{2}{3}$ and $\frac{4}{3}$, the product $\frac{8}{9}$ is less than 1, but yet nearer to it than $\frac{2}{3}$ is, which is also less than 1.—On these principles he founds an ingenious, though not very obvious, approximation to the logarithms of given numbers.

In the Philos. Trans. a Mr. John Long gave a method of constructing logarithms, by means of a small table, something in the manner of one of Briggs's methods for the same purpose.

Also in the Philos. Trans. vol. 61, a tract on the construction of logarithms is given by the ingenious Mr. William Jones. In this method, all numbers are considered as some certain powers of a constant determined root: thus, any number $x$ is considered as $z$ power of any root $r$, or $x = r^z$ is taken as a general expression for all numbers in terms of the constant root $r$ and a variable exponent $z$. Now the index $z$ being the logarithm of the number $x$, therefore to find this logarithm, is the same thing as to find what power of the radix $r$ is equal to the number $x$.

An elegant tract on logarithms, as a comment on Dr. Halley's method, was also given by Mr. Jones in his Synopsis Palmariorum Matheseos, published in the year 1706.

In the year 1742, Mr. James Dodson published his Anti-logarithmic Canon, containing all logarithms under 100,000, and their corresponding natural numbers to eleven places of figures, with all their differences and the proportional parts; the whole arranged in the order contrary to that used in the common tables of numbers and logarithms, the exact logarithms being here placed first, and their corresponding nearest numbers in the columns opposite to them.

And in 1767, Mr. Andrew Reid published an "Essay on Logarithms," in which he shews the computation of logarithms from principles depending on the binomial theorem, and on the nature of the exponents of powers, the logarithms of numbers being here considered as the exponents of the

powers of 10. In this way he brings out the usual series for logarithms, and exemplifies Dr. Halley's construction of them.

The celebrated Lagrange has given the following method of investigating the logarithmic series by the common operations of algebra.

Let $a$ be the radical number of the system of logs., let $y$=any number and $x$ its logarithm.

Then $y=a^x$, or $y=(1+a-1)^x$, or

$$\left((1+a-1)^n\right)^{\frac{x}{n}}$$

The quantity $(1+a-1)^n$ expanded into a series by the bin. Theor. is $1+n(a-1)+\frac{n(n-1)}{2}(a-1)^2+$&c. which arranged according to the powers of $n$ is $1+An+Bn^2$ +&c. here it is evident that $A=(a-1)-\frac{1}{2}(a-1)^2+\frac{1}{3}(a-1)^3-$&c.: with respect to the other coefficients B, C, &c. as they afterwards disappear in the calculation it is not necessary to investigate their values, therefore $y=(1+An+Bn^2+$, &c.$)^{\frac{x}{n}}$, this series raised to the power $\frac{x}{n}$ gives $y=1+\frac{x}{n}(An+Bn^2+$, &c.$)+\frac{x(x-n)}{2n^2}(An+Bn^2+$, &c.$)^2+\frac{x(x-n)(x-2n)}{2.3.n^3}(An+Bn^2+$ &c.$)^3$, which, rejecting the powers of $n$ from the numerators and denominators, becomes $y=1+x(A+Bn+$ &c.$)+\frac{x(x-n)}{1.2}(A+Bn$ &c.$)^2+\frac{x.x-n.x-2n}{1.2.3}+(A+Bn+$&c.$)^3+$ &c. Now this must be universally true whatever be the value of $n$, therefore it must hold true when $n=o$, in which case this last equation becomes $y=a^x=1+\frac{xA}{1}+\frac{x^2A^2}{1.2}+\frac{x^3A^3}{1.2.3}+$, &c. This series gives the number when the log. is given: the series for finding the log. when the number is given may in like manner be investigated as follows: The equation $y=a^x$ may also stand thus, $(1+y-1)=(1+a-1)^x$ therefore also, $(1+y-1)^n=(1+a-1)^{nx}$, where $n$ is an indefinite quantity, which however is not to enter into the values of $x$ when expressed in terms of $y$. By the Binom. Theor. we get $1+\frac{n}{1}(y-1)+\frac{n(n-1)}{1.2}(y-1)^2+\frac{n(n-1)(n-2)}{1.2.3}(y-1)^3+$ &c. $=1+\frac{nx}{1}(a-1)+\frac{nx(nx-1)}{1.2}(a-1)^2+\frac{nx(nx-1)(nx-2)}{1.2.3}(a-1)^3+$&c. which equation, taking 1 from both sides, and dividing by $n$, becomes $(y-1)+\frac{n-1}{1.2}(y-1)^2+\frac{(n-1)(n-2)}{1.2.3}(y-1)^3+$ &c. $=x(a-1)+\frac{x(nx-1)}{1.2}(a-1)^2+\frac{x(nx-1)(nx-2)}{1.2.3}(a-1)^3$ +&c. Let the indefinite quantity $n$ be now taken $=0$ and the equation becomes $(y-1)-\frac{1}{2}(y-1)^2+\frac{1}{3}(y-1)^3-$ &c. $=x\left((a-1)-\frac{1}{2}(a-1)^2+\frac{1}{3}(a-1)^3-\text{\&c.}\right)=xA$ the quantity A being the same as already determined therefore $x=\frac{1}{A}\times\left(y-1-\frac{(y-1)^2}{2}+\frac{(y-1)^3}{3}-\frac{(y-1)^4}{4}+, \text{\&c.}\right)$

The following investigations and resulting series may often be found serviceable.

If $n^x=v=1+u$, then

$$x=\frac{1}{m}\times\left((v-1)-\tfrac{1}{2}(v-1)^2+\tfrac{1}{3}(v-1)^3-\text{\&c.}\right)$$

$$=\frac{1}{m}\times\left(u-\tfrac{1}{2}u^2+\tfrac{1}{3}u^3-\tfrac{1}{4}u^4+\text{\&c.}\right) \text{ where}$$

$m=(n-1)-\frac{1}{2}(n-1)^2+\frac{1}{3}(n-1)^3-\frac{1}{4}(n-1)^4$ +&c.

Or, log. $(1+u)=\frac{1}{m}+(u-\frac{1}{2}u^2+\frac{1}{3}u^3-\frac{1}{4}u^4$ +&c.)

$$=\text{log. } u+\frac{1}{m}+\left(u^{-1}-\tfrac{1}{2}u^{-2}+\tfrac{1}{3}u^{-3}-\tfrac{1}{4}u^{-4}-\text{\&c.}\right)$$

the second of these series converging when the former does not.

If $v$ be any positive number greater than 2, then.

Log. $v=\frac{1}{m}\times\left((v-1)-\frac{1}{2}(v-1)^2+\frac{1}{3}(v-1)^3-\frac{1}{4}(v-1)^4+\text{\&c.}\right)$ will converge: and by substituting $\frac{1}{v}$ for $v$, we have

$$\text{Log. } v=\frac{1}{m}\times\left(\frac{v-1}{v}+\tfrac{1}{2}\left(\frac{v-1}{v}\right)^2-\tfrac{1}{3}\left(\frac{v-1}{1}\right)^3+\text{\&c.}\right)$$

a converging series when $v$ is any positive number greater than $\frac{1}{2}$. The modulus of the assumed system of logarithms is here represented by $\frac{1}{m}$.

If $x$ be the logarithm of any number $n$, then $n=1+mx+\frac{m^2x^2}{2}+\frac{m^3x^3}{2.3}+\frac{m^4x^4}{2.3.4}+$&c. where if $x$ be taken $=\frac{1}{m}$, it follows that in any system of logarithms the modulus is always the logarithm of $1+\frac{1}{1}+\frac{1}{2}+\frac{1}{2.3}+\frac{1}{2.3.4}$

+&c. = logarithm of 2·718281828 &c. in that system.

The publications on the subject of logarithms have been so numerous, that we can mention but a small proportion of them: the following are the most respectable or curious.

1. A treatise containing Briggs's logarithms of common numbers from 1 to 20,000, to 11 places of figures, with the logarithmic sines and tangents but only to eight places. By D. Henrion, at Paris, 1626.

2. Briggs's logarithms, with their differences to 10 places of figures, besides the index for all numbers to 100,000; as also the logarithmic sines, tangents, and secants, for every minute of the quadrant, with the explanation and uses in English. By George Miller, Lond. 1631.

3. *Trigonometria*, by Richard Norwood, 1631; containing Briggs's logarithms from 1 to 10,000, as well as for the sines, tangents, and secants, to every minute, both to several places of figures besides the index. The author complains very much of the unfair practices of both the former authors.

4. *Directorium, Generale Uranometricum;* by Francis Bonaventure Cavalerius, Bologna, 1632. In this are Mr. Briggs's tables of logarithmic sines, tangents, secants, and versed sines each to eight places of figures, for every second of the first 5 minutes, for every 5 seconds from 5 to 10 minutes, for every 20 seconds from 20 to 30 minutes, for every 30 seconds from 30 minutes to 1½ degree, and for every minute in the rest of the quadrant. It contains also the logarithms of natural numbers from 1 to 10,000, with the first table of versed sines that ever was published. The author likewise, gives the first intimation of the method of finding the area or spherical surface contained by various arcs described on the surface of a sphere.

5. In 1643 appeared the *Trigonometria* of the same author, containing the logarithms of the natural numbers from 1 to 1000, with their differences to eight places of figures; likewise a table of natural and logarithmic sines, tangents and secants; the former to seven, the latter to eight, places of figures; viz. to every 10″ of the first 30′, to every 30″ from 30′ to 1°, and the same for their complements, or backwards through the last degree of the quadrant; the intermediate 88° being only to every minute.

6. *Tabulæ Logarithmicæ;* by Mr. Nathaniel Rowe, pastor of Benaire in Suffolk: Lond. 1633. In this work are contained Briggs's logarithms of natural numbers from 1 to 100,000, to eight places of figures; likewise the logarithmic sines and tangents to every 100th part of degrees to ten places.

7. *Clavis Universa, Trigonometriæ;* Hamburg, 1634; containing tables of Briggs's logarithms from 1 to 2000; and of sines, tangents, and secants, for every minute both for seven places.

8. *Trigonometria Britannica*, by John Newton, London, 1658. In this the logarithmic tables of natural numbers were reduced to their most convenient form; the author having availed himself of the labours of Wingate and Roe, uniting their several methods, and disposing of the whole as in the best logarithmic tables used at present. It contains likewise the logarithmic sines and tangents to eight figures besides the index; for every hundredth part of a degree, with the differences, and for thousandth parts in the first three degrees. He censures the unfair practices of some former publishers of logarithms, particularly of Vlacq already mentioned.

9. *Mathesis Nova*, by John Caramual, 1670. This contained 1000 logarithms, both of the forms of Napier and Briggs, as well as 1000 of what he calls *perfect logarithms*, viz. those of Briggs's first method of construction; which differs from the last only in this, that the last increases, whilst the first decreases; the radix or logarithm of the ratio of 10 to 1 being the very same in both.

10. Sherwin's Mathematical Tables, published in 8vo, form the most complete collection of any; containing, besides the logarithms of all numbers to 101,000, the sines, tangents, secants, versed sines both natural and logarithmic, to every minute of the quadrant. The first edition was printed in 1706; but the third, published in 1742, and revised by Gardiner, is looked upon to be superior to any other. The fifth and last edition, published in 1771, is so incorrect, that no dependence can be placed upon it.

11. Tables of logarithms from 1 to 102,100, and for the sines and tangents to every 10 seconds of each degree in the quadrant; as also for the sines of the first 72 minutes to every single second, with other useful and necessary tables. By Gardiner, London, 1742. This work contains a table of logistical logarithms, and three smaller tables to be used for finding the logarithms of numbers to 20 places of figures. Only a small number of these tables was printed, and that by subscription; and they are now in the highest esteem for accuracy and usefulness. An edition of these tables was printed at Avignon in France in 1770, with the addition of sines and tangents for every single second in the first four degrees, and a small table of hyperbolic logarithms, taken from a treatise on fluxions by the late Mr. Thomas Simpson. The tables are to seven places of figures, but somewhat less correct than those published by Gardiner himself.

12. An Antilogarithmic Canon for readily finding the number corresponding to any logarithm, was begun by the algebraist Mr. Harriot, who died in 1621; and completed by Mr. Walter Warner, the editor of Harriot's works, before 1640, but never was published for want of encouragement to print it. In 1714 a small specimen of such a canon appeared in the Philosophical Transactions for that year by Mr. Long of Oxford; and in

1742 a complete Antilogarithmic Canon appeared by Mr. James Dodson, in which the numbers corresponding to each logarithm from 1 to 100,000 are computed to 11 places of figures; as before mentioned.

13. In 1783 were published M. Callet's tables at Paris; and, in 1795 appeared an enlarged edition, in 2 octavo volumes entitled "Tables portatives de Logarithmes, contenant les Logarithmes des nombres depuis 1 jùsqua 108000; les logarithmes des sinus et tangentes de seconde en seconde pour les cinq premiers degres, de dix en dix secundes pour tous les degres du quart de cercle; et, suivant la nouvelle division centesemale, de dix-millieme en dix-millieme. Précédées d'un discours préliminaire sur l'explication, l'usage et la sommation des logarithmes, et sur leur application à l'astronomia, a la navigation, a la Géométrie-pratique, et aux calculs d' interests, &c." This is an elegant book, most beautifully printed, and stereotyped at the celebrated Didot's press: it is more correct than any preceding *French* book of logarithms, though it contains a few errors not noticed in the list of errata.

14. Dr. Hutton's "Mathematical Tables; containing the Common, Hyperbolic, and Logistic Logarithms. Also Sines, Tangents, Secants, and Versed Sines, both natural and Logarithmic. Together with several other Tables useful in Mathematical Calculations. To which is prefixed a large and original History of the Discoveries and Writings relating to those subjects; with the complete description and use of the tables." This work was first published in the year 1785, and has since gone though several editions under the care of the leared, scientific, and indefatigable author. It is deservedly held in the highest estimation, on account of its extreme accuracy, and the very valuable information it contains respecting the history of logarithms, and the dependant branches of mathematics.

15. Michael Taylor's Tables of Logarithmic Sines and Tangents, to every second of the Quadrant, to which is prefixed a table of logarithms from 1 to 100,000, &c. This also is a very valuable work, and has a useful introduction drawn up by Dr. Maskelyne. But being a large quarto volume, of high price, it is less adapted to general use than the preceding, which is an octavo, and sells at a moderate price.

16. Vega's "Logarithmische, trigonometrische, und andere zum Gelbravch der Mathematick eingerichtete Tafelu und formelu." This is a neat book, and the collection of formulæ very valuable.

17. Jose Melitas da Meta's "Taboas logarithmicas des senos; tangentes e secantes te todos as graos e minutos de quadrante, e dos numeros naturaes des de 1 ate 10000 sequidas de outras nuitas taboas uteis e necessarias em a navegaça." This is in 8vo, and was first published in 1790.

18. "Tables Trigonométriques décimales, ou Table des Logarithmes des Sinus, Secantes et Tangentes, suivant la division du quart de cercle en 100 degres, du degre en 100 minutes, et de la minute en 100 secondes; précédérs de la Table des Logarithmes des nombres depuis dix mille jusqu'à cent mille, et de plusieurs Tables subsidiaires: calculéer par Ch. Borda, revues, augmentées, et publiées par J. B. Delambre." In this work, which is published in 4to, the tables themselves, at least the trigonometrical ones will be of no use where the decimal division of the quadrant is not adopted; but the introduction by Delambre exhibits a very perspicuous and scientific investigation of the most useful logarithmic series, and trigonometrical formulæ; and may therefore be read with great advantage by the general mathematical student.

19. Lastly, we must not forget to mention Baron Maseres's Scriptores Logarithmici, being "a collection of several curious tracts on the nature and construction of logarithms mentioned in Dr. Hutton's historical introduction to his new edition of Sherwin's mathematical tables," with several other curious disquisitions on subjects connected with logarithms and trigonometry. This very interesting work is in 5 quarto volumes.

Besides the authors above-mentioned, many others have treated on the subject of logarithms; among the principal of whom are Leibnitz, Euler, Maclaurin, Wolfius, Keill, and professor Simson in an ingenious geometrical tract on logarithms, contained in his posthumous works, elegantly printed at Glasgow in the year 1776, at the expence of the learned earl Stanhope, and by his lordship disposed of in presents among gentlemen most eminent for mathematical learning.

For the description and uses of logarithms in numeral calculations, with the shortest method of constructing them, see the Historical introduction to Dr. Hutton's Logarithms, pa. 124 and seq.

*Briggs's* or *Common* LOGARITHMS, are those that have 1 for the logarithm of 10, or which have 0·4342944819 &c. for the modulus; as has been explained above.

*Hyperbolic* LOGARITHMS, are those that were computed by the inventor Napier, and called also sometimes *Natural Logarithms*, having 1 for their modulus, or 2·302585092994 &c. for the logarithm of 10, These have since been called Hyperbolic Logarithms, because they are analogous to the areas of a *right angled hyperbola* between the asymptotes and the curve. Though, as every system of logarithms may be referred to some one hyperbola, we should prefer calling these *Neperean* logarithms.

*Logistic* LOGARITHMS, are certain logarithms of sexagesimal numbers or fractions, useful in astronomical calculations. The

logistic logarithm of any number of seconds, is the difference between the common logarithm of that number and the logarithm of 3600, the seconds in 1 degree.

The chief use of the table of logistic logarithms, is for the ready computing a proportional part in minutes and seconds, when two terms of the proportion are minutes and seconds, or hours and minutes, or other such sexagesimal numbers. See the Introd. to Hutton's Logarithms, pa. 144.

*Imaginary* LOGARITHM, a term used in the log. of imaginary and negative quantities; such as $-a$, or $\sqrt{-a^2}$ or $a\sqrt{-1}$. The fluents of certain imaginary expressions are also imaginary logarithms; as of $\frac{\dot{x}}{x\sqrt{-1}}$, or of $\frac{a\dot{x}}{cx\sqrt{-1}}$, &c. See Euler Analys. Infin. vol. i. pa. 72, 74.

It is well known that the expression $\frac{\dot{x}}{x}$ represents the fluxion of the logarithm of $x$, and therefore the fluent of $\frac{\dot{x}}{x}$ is the logarithm of $x$; and hence the fluent of $\frac{\dot{x}}{x\sqrt{-1}}$ is the imaginary logarithm of $x$.

However, when these imaginary logarithms occur in the solutions of problems, they may be transformed into circular arcs or sectors; that is, the imaginary logarithm, or imaginary hyperbolic sector, becomes a real circular sector. See Bernoulli Oper. tom. i. pa. 400, and pa. 512. Maclaurin's Fluxions, art. 762. Cotes's Harmon. Mens. pa. 45. Walmesley, Anal. des Mes. pa. 63.

*Proportional* LOGARITHMS, are calculated from the common logarithms by subtracting the log. of the given number from the log. of 3. There is a table of these proportional logarithms in the *Requisite Tables*; and for proofs of their advantage and accuracy, see O. Gregory's Astronomy, pa. 451.

LOGARITHMIC or LOGISTIC *curve*, a curve which obtained its name from its properties and uses in explaining and constructing logarithms, because its ordinates are in geometrical progression, while the corresponding abscissas are in arithmetical progression; so that the abscissas are as the logarithms of the corresponding ordinates. Hence the curve will be constructed in this manner: upon any right line, as an axis, take the equal parts AB, BC, CD, &c. or the arithmetical progression AB, AC, AD, &c.; and at the points A, B, C, D, &c. erect the perpendicular ordinates AP, BQ, CR, DS, &c. in a geometrical progression; so is the curve line drawn through all the points P, Q, R, S, &c. the logarithmic, or logistic curve; so called, because any absciss AB, is as the logarithm of its ordinate BQ. So that the axis ABC &c. is an asymptote to the curve. (fig. 7. pl. 99.)

Hence, if any absciss AN $= x$, its ordinate NO $= y$, AP $= 1$, $a =$ a certain constant quantity, or the modulus of the logarithms; then the equation of the curve is $x = a \times$ log. of $y =$ log. of $y^a$.

And if the fluxion of this equation be taken, it will be $\dot{x} = \frac{a\dot{y}}{y}$; which gives this proportion,

$$\dot{y} : \dot{x} :: y : a$$

but in any curve $\dot{y} : \dot{x} :: y :$ the subtangent AT; and therefore the subtangent of this curve is everywhere equal to the constant quantity $a$, or the modulus of the logarithms.

*To find the Area contained between two ordinates.* Here the fluxion of the area $\dot{A}$ or $y\dot{x}$ is $y \times \frac{a\dot{y}}{y} = a\dot{y}$; and the corrrect fluent is $A = a \times (AP - y)$
$= a \times (AP - NO) = a \times PV = AT \times PV$.
That is, the area APON between any two ordinates, is equal to the rectangle of the constant subtangent and the difference of the ordinates. Hence, when the absciss is infinitely long, or the farther ordinate equal to nothing, then the infinitely long area APZ is equal AT $\times$ AP, or double the triangle APT.

*For the Solid formed by the curve revolving about its axis*, AZ. The fluxion of the solid is $\dot{s} = py^2\dot{x} = py^2 \times \frac{a\dot{y}}{y} = pay\dot{y}$, where $p$ is $= 3{\cdot}1416$; and the correct fluent is $s = \frac{1}{2}pa \times (AP^2 - y^2) = \frac{1}{2}p \times AT \times (AP^2 - NO^2)$, which is half the difference between two cylinders of the common altitute $a$ or AT, and the radii of their bases AP, NO. Whence supposing the solid infinitely long towards Z, where $y$ or the ordinate is nothing, the infinitely long solid will be equal to $\frac{1}{2}pa \times AP^2 = \frac{1}{2}p \times AT \times AP^2$, or half the cylinder on the same base and its altitude AT. Thus it appears that *an infinite space* may and actually does generate a *solid of finite capacity*: a most curious truth! The same may be proved of the solid formed by the rotation of an Apollonian hyperbola upon its asymptote.

It has been said that Gunter gave the first idea of a curve whose abscisses are in arithmetical progression, while the corresponding ordinates are in geometrical progression, or whose absciss are the logarithms of their ordinates; but we have not found it noticed in any part of his writings. This curve was afterwards considered by others, and named the logarithmic or logistic curve by Huygens in his Dissertatio de Causa Gravitatis, where he enumerates all the principal properties of

it, shewing its analogy to logarithms. Many other learned men have also treated of its properties; particularly Le Seur and Jacquier, in their Comment on Newton's Principia; Dr. John Keill, in the elegant little Tract on Logarithms subjoined to this edition of Euclid's elements; and Francis Maseres Esq. Cursitor Baron of the Exchequer, in his ingenious Treatise on Trigonometry: see also Bernoulli's Discourse in the Acta Eruditorum for the year 1696, pa. 216; Guido Grando's Demonstratio Theorematum Huygeneanorum circa logisticam seu Logarithmicam Lineam; and Emerson on Curve Lines, pa. 19.—It is indeed rather extraordinary that this curve was not sooner announced to the public, since it results immediately from Napier's manner of conceiving the generation of Logarithms, by only supposing the lines which represent the natural numbers as placed at right angles to that upon which the logarithms are taken.

This curve greatly facilitates the conception of Logarithms to the imagination, and affords an almost intuitive proof of the very important property of their fluxions, or very increments, namely, that the fluxion of the number is to the fluxion of the logarithm, as the number is to the subtangent; as also of this property, that if three numbers be taken very nearly equal, so that their ratios may differ but a little from a ratio of equality, as the three numbers 10000000, 1000000, 10000001 10000002, their differences will be very nearly proportional to the logarithms of the ratios of those numbers for each other: all which follows from the logarithmic arcs being very little different from their chords, when they are taken very small. The constant subtangent of this curve is what was afterwards by Cotes called the modulus of the System of logarithms.

Let XBM, YB$m$ (fig. 8. pl. 99) be two different logarithmics, constructed upon the same axis VZ, (which is their common asymptote), having the same origin A of abscissas or of the logarithmas, and the same prime ordinate AB which marks the unit of numeration for both cases. The curves being in other respects totally different, and having consequently different moduli, after having mutually intersected in B, can have no other ordinates equal as AB to equal abscissas. Now, taking on the axis AZ, two abscissas AP, A$p$, such that the corresponding ordinates PM, $pm$, for the two logarithmics shall be equal, or that drawing M$m$ it shall be equal and parallel to P$p$: suppose AP$=x$, A$p$=X, PM or $pm=y$, the modulus for XBM$=m$, and that for YB$m$=M, we shall have the two equations $\frac{\dot{y}}{y}=\frac{\dot{x}}{m}$, and $\frac{\dot{y}}{y}=\frac{\dot{X}}{M}$. Therefore $\frac{\dot{x}}{m}=\frac{\dot{X}}{M}$, and consequently $\frac{x}{m}=\frac{X}{M}$. This equation is complete, because the two logarithms $x$ and X become both zero at the same place, that is to say, at the point A. Hence we have $x : X :: m : M$, which shews that the logarithms of the same number in two different logarithms, are respectively as the moduli of those curves. Knowing therefore the logarithms $x$ for the given modulus $m$, we of course know the logarithms for any other modulus M; since $X=x\frac{M}{m}$.

Mr. Baily in his "Doctrine of Interest and Annuities," applies the properties of conterminous logarithms very ingeniously to the optical elucidation (if we may so call it) of the leading theorems in that doctrine. See pa. 140, of that work.

*Atmospherical* LOGARITHMIC, is a kind of logarithmic curve described in the following manner: In fig. 9, pl. 99, let the point C represent the centre of the earth, CA the earth's semidiameter, and AB any height above the surface; at A place a right line AD, of any finite length, at right angles with AC. In the right line AC, towards C, take A$\beta$, such, that CA may be to A$\beta$ in the proportion of CB to BA. In a right line drawn through $\beta$, at right angles with AC, take $\beta$E, of such length, as to be to AD in the proportion of the density of the air at B to the density at A, the earth's surface. The curve, which the point E always touches, is a *logarithmic*, of which AC is the asymptote; and is called by Dr. Horsley and subsequent mathematicians, the *atmospherical logarithmic.*

Imagine this curve described, and take another height A$b$, and take A$\epsilon=\frac{CA\times Ab}{Cb}$, and draw $\epsilon e$ parallel to $\beta$E, meeting the curve in $e$. Then $\beta\epsilon$ is the logarithm of the ratio of $\beta$E to $\epsilon e$, or of the density at B to the density at $b$. But if the greater of the two heights, AB and A$b$, bear but a very small proportion to the semidiameter of the earth, their difference B$b$ will be very nearly equal to $\beta\epsilon$.

For, because CB : BA=CA : A$\beta$ (by construction)

Therefore, by conversion, CB : CA=CA : C$\beta$.

In like manner, and by inversion, - } CA : C$b$=C$\epsilon$: CA.

By equi-distance perturbate - } CB : C$b$=C$\epsilon$ : C$\beta$.

And converting, - CB : B$b$=C$\epsilon$: C$\epsilon$.

By permutation, - B$b$ : $\beta\epsilon$=CB : C$\epsilon$.

But when AB is infinitely diminished, CB= CA ultimately. Also A$b$ being infinitely diminished, C$\epsilon$=CA ultimately. Therefore CB=C$\epsilon$ ultimately, and B$b$=$\beta\epsilon$ ultimately. Q. E. D.

Now AB A$b$ will always be so small, with respect to CA, if B and $b$ be supposed to represent any accessible places, that CB, C$\epsilon$, and B$b$, $\beta\epsilon$, may always, in this case be con-

sidered as in their ultimate proportion of equality.

It is still therefore to be admitted, as a principle, in practice, that the difference of elevation of any two places is as the difference of the tabular logarithms of the heights of the quicksilver in the barometer at the same time, at both places; that is, it is the logarithm of the ratio of those heights in some system of logarithms. And the heights of the quicksilver being given, by observation, the difference of elevation will be known, if that particular system can be determined; that is, if the *modulus* of the system, or the length of the subtangent of the curve DE*e* of that system, can be ascertained in some known measure, as English fathoms, or Paris toises.

The easiest method of doing this, that theory suggests, is to compare barometers at two stations, suppose B and *b*, each of a known elevation AB and A*b*, above the level of the sea. For the logarithms of any given ratio, in different systems, are proportional to the subtangents; and the difference of elevation, B*b*, diminished in the proportion of CB, (the distance of the higher station from the earth's centre) to C$\beta$, (a third proportional to C*b*, the distance of the lower station from the earth's centre, and CA, the earth's semidiameter) is the logarithm of the ratio of the density at B, to the density at *b* (that is, of the columns of quicksilver sustained in the barometer at B and *b*) in the atmospherical system. Therefore, as the difference of the tabular logarithms, of these columns, to the subtangent of the tabular system, so should B*b*, diminished as hath been said (that is, so should $\beta\beta$) be to the subtangent of the atmospherical logarithmic. The utmost height, to which we can ascend, above the level of the sea, is so small, that the reduction of B*b* may, even in this investigation, always be neglected. For, if AB were four English miles, which exceeds the greatest accessible heights, even of the Peruvian mountains, and A$\beta$ three, $\beta\beta$ would be scarce one part in 500 less than B*b*. So that, by comparing barometers at different elevations, within a mile above the level of the sea, the subtangent of the atmospherical curve might be determined, as it should seem without sensible error, by taking simply the difference of elevation without reduction, for the logarithm of the ratio of the observed heights of the quicksilver in the atmospherical system.

This subtangent is different in length at different times; though M. de Luc has shewn, that it is constant in a given temperature; so that if the temperature of the air is $+16\frac{3}{4}$ of his scale, the difference of the tabular logarithms of the heights of the quicksilver in the barometer gives the difference of elevation in 1000ths of a Paris toise; whence the number, which is the modulus of Briggs's system, expresses the length of the subtangent of the atmospherical curve, such as it is in that temperature, in 1000ths of a Paris toise. Phil. Trans. vol. lxiv. part i. p. 231, &c., or New Abridgment, vol. xiii. pa 532. See also Gregory's Mechanics, vol. i. pa. 473—477, for more on this subject.

Logarithmic, or logistic, spiral, a curve constructed as follows. Divide the arch of a circle into any equal parts AB, BD, DE, &c; (fig. 10. pl. 99.) and upon the radii drawn to the points of division take C*b*, C*d*, C*e*, &c, in a geometrical progression; so is the curve A*bde* &c. the logarithmic spiral; so called, because it is evident that AB, AD, AE, &c, being arithmeticals, are as the logarithms of CA, C*b*, C*d*, C*e*, &c, which are geometricals; and a spiral, because it winds continually about the centre C, coming continually nearer, but without ever really falling into it.

In the Philosophical Transactions, vol. 19, or New Abridgment, vol. 4, p. 70, Dr. Halley has happily applied this curve to the division of the meridian line in Mercator's chart. See also Cotes's Harmonia Mens., Guido Grando's Demonst. Theor. Huygen., the Acta Erudit. 1691, and Emerson's Curves, &c.

Logarithmic lines. For many mechanical purposes it is convenient to have the logarithms of numbers laid down on scales, as well as the logarithmic sines and tangents; by which means, computations may be carried on by mere mensuration with compasses. Lines of this kind are always put on the common Gunter's scale; but as these instruments must be extended to a very great length, in order to contain any considerable quantity of numbers, it becomes an object of importance to shorten them. Such an improvement has been made by Mr. William Nicholson, and published in the 77th volume of the Philosophical Transactions, or New Abridgment, vol. 16, pa. 262. This gentleman's instrument differs from the others principally in the lines being arranged in concentric circles, instead of parallel right-lines, a disposition which adds greatly to their portability and convenience.

LO'GGERHEAD. *s.* (*log* and *head.*) A dolt; a blockhead; a thickskull (*Shaks.*).

*To fall to* Loggerheads. *To go to* Loggerheads. To scuffle; to fight without weapons (*L'Estrange*).

LO'GGERHEADED. *a.* (from *loggerhead.*) Dull; stupid; doltish (*Shakspeare*).

LOGIC, the art of thinking justly; or of making a right use of our rational faculties, in defining, dividing, and reasoning: or, as it is defined by an excellent writer on this subject, logic is the art of using reason well in our enquiries after truth, and the communication of it to others.

The word is Greek, λογικη, derived from λογος, *se mo, discourse*; because thinking is only an inward mental discourse, wherein the mind converses with itself.

Logic is also sometimes called *dialectica*; and sometimes the *canonical art*, as being a canon, or rule, for directing us in our reasonings.

The precise business of logic is to explain the proper manner of conducting the reasoning powers, in order to the attainment of truth and knowledge. It lays open those errors and mistakes we are apt, through inattention, to run into; and

teaches us how to distinguish between truth, and what only carries the appearance of it. By these means we grow acquainted with the nature and force of the understanding; see what things lie within its reach; where we may attain certainty and demonstration; and when we must be contented with probability.

Logic is usually divided into four parts, which relate to *perception*, *judgment*, *reasoning*, and *method*. It is the third of these we shall principally consider here; referring our remarks on the other particulars to their respective words in this Pantologia.

We find ourselves surrounded with a variety of objects, which acting differently upon our senses, convey distinct impressions into the mind, and thereby rouse the attention and notice of the understanding. By reflecting too on what passes within us, we become sensible of the operations of our own minds, and attend to them as a new set of impressions. But in all this there is only bare consciousness. The mind, without proceeding any farther, takes notice of the impressions that are made upon it, and views things in order, as they present themselves one after another. This attention of the understanding to the object acting upon it, whereby it becomes sensible of the impressions they make, is called by logicians *perception*; and the notices themselves, as they exist in the mind, and are there treasured up to be the materials of thinking and knowledge, are distinguished by the name of *ideas*. See ABSTRACTION, IDEA, PERCEPTION.

### *The Grounds of Human Judgment.*

The mind being furnished with ideas, its next step in the way to knowledge is the comparing these ideas together, in order to judge of their agreement or disagreement. In this joint view of our ideas, if the relation is such as to be immediately discoverable by the bare inspection of the mind, the judgments thence obtained are called *intuitive*, from a word that signifies *to look at*; for in this case a mere attention to the ideas compared suffices to let us see how far they are connected or disjoined. Thus, *that the Whole is greater than any of its Parts*, is an intuitive judgment: nothing more being required to convince us of its truth than an attention to the ideas of *whole* and *part*. And this too is the reason why we call the act of the mind forming these judgments intuition: as it is indeed no more than an immediate perception of the agreement or disagreement of any two ideas.

II. But here it is to be observed, that our knowledge of this kind respects only our ideas, and the relations between them; and therefore can serve only as a foundation to such reasonings as are employed in investigating those relations. Now it so happens, that many of our judgments are conversant about facts, and the real existence of things, which cannot be traced by the bare contemplation of our ideas. It does not follow, because I have the idea of a circle in my mind, that therefore a figure answering to that idea has a real existence in nature. I can form to myself the notion of a centaur, or golden mountain, but never imagine on that account that either of them exists. What then are the grounds of our judgment in relation to facts? *Experience* and *testimony*. By experience we are informed of the existence of the several objects which surround us, and operate upon our senses. Testimony is of a wider extent, and reaches not only to objects beyond the present sphere of our observation, but also to facts and transactions, which being now past, and having no longer any existence, could not without this conveyance have fallen under our cognizance.

III. Here we have three foundations of human judgment, from which the whole system of our knowledge may with ease and advantage be derived. First, intuition, which respects our ideas themselves, and their relations; and is the foundation of that species of reasoning which we call *demonstration*. For, whatever is deduced from our intuitive perceptions by a clear and connected series of proofs, is said to be demonstrated, and produces absolute certainty in the mind. Hence the knowledge obtained in this manner is what we properly term *science*; because in every step of the procedure it carries its own evidence along with it, and leaves no room for doubt or hesitation. And what is highly worthy of notice; as the truths of this class express the relation between our ideas, and the same relations must ever and invariably subsist between the same ideas, our deductions in the way of science constitute what we call *eternal*, *necessary*, and *immutable truths*. If it be true that the whole is equal to all its parts, it must be so unchangeably; because the relation of equality being attached to the ideas themselves must ever intervene where the same ideas are compared. Of this nature are all the truths of natural religion, morality, and mathematics, and in general whatever may be gathered from the bare view and consideration of our ideas.

IV. The second ground of human judgment is *experience*; from which we infer the existence of those subjects that surround us, and fall under the immediate notice of our senses. When we see the sun, or cast our eyes towards a building, we not only have perceptions of these objects within ourselves, but ascribe to them a real existence out of the mind. It is also by the information of the senses that we judge of the qualities of bodies, as when we say that *snow is white*, *fire hot*, or *steel hard*. For, as we are wholly unacquainted with the internal structure and constitution of the bodies that produce these sensations in us, nay, and are unable to trace any connection between that structure and the sensations themselves, it is evident that we build our judgments altogether upon observation, ascribing to bodies such qualities as are answerable to the perceptions they excite in us. Not that we ever suppose the qualities of bodies to be things of the same nature with our perceptions; for there is nothing in fire similar to our sensation of heat, or in a sword similar to pain: but that when different bodies excite in our minds similar perceptions, we necessarily ascribe to these bodies not only an existence independent of us, but likewise similar qualities of which it is the nature to produce similar perceptions in the human mind. But this is not the only advantage derived from experience; for to that too are we indebted for all our knowledge regarding the co-existence of sensible qualities in objects, and the operations of bodies one upon another. Ivory, for instance, is hard and elastic; this we know by experience, and indeed by that alone. For, being altogether strangers to the true nature both of elasticity and hardness, we cannot by the bare contemplation of our ideas determine how far the one necessarily implies the other, or

whether there may not be a repugnance between them. But when we observe them to exist both in the same object, we are then assured from experience that they are not incompatible; and when we also find that a stone is hard and not elastic, and that air though elastic is not hard, we also conclude, upon the same foundation, that the ideas are not necessarily conjoined, but may exist separately in different objects. In like manner, with regard to the operations of bodies one upon another, it is evident that our knowledge this way is all derived from observation. Aqua-regia dissolves gold, as has been found by frequent trial; nor is there any other way of arriving at the discovery. Naturalists may tell us, if they please, that the parts of aqua regia are of a texture apt to insinuate between the corpuscles of gold, and thereby loosen and shake them asunder. If this is a true account of the matter, it will notwithstanding be allowed that our conjecture in regard to the conformation of these bodies is deduced from the experiment, and not the experiment from the conjecture. It was not from any previous knowledge of the intimate structure of aquaregia and gold, and the aptness of their parts to act or to be acted upon, that we came by the conclusion above-mentioned. The internal constitution of bodies is in a manner wholly unknown to us; and could we even surmount this difficulty, yet, as the separation of the parts of gold implies something like an active force in the menstruum, and we are unable to conceive how it comes to be possessed of this activity, the effect must be owned to be altogether beyond our comprehension. But when repeated trials had once confirmed it, insomuch that it was admitted as an established truth in natural knowledge, it was then easy for men to spin out theories of their own invention, and contrive such a structure of parts, both for gold and aquaregia, as would best serve to explain the phenomenon upon the principles of that system of philosophy they had adopted.

V. From what has been said it is evident, that as intuition is the foundation of what we call *scientifical* knowledge, so is experience of *natural*. For this last being wholly taken up with objects of sense, or those bodies that constitute the natural world; and their properties, as far as we can discover them, being to be traced only by a long and painful series of observations; it is apparent, that, in order to improve this branch of knowledge, we must betake ourselves to the method of trial and experiment.

VI. But though experience is what we may term the immediate foundation of natural knowledge, yet with respect to particular persons its influence is very narrow and confined. The bodies that surround us are numerous; many of them lie at a great distance, and some quite beyond our reach. Life is so short, and so crowded with cares, that but little time is left for any single man to employ himself in unfolding the mysteries of nature. Hence it is necessary to admit many things upon the testimony of others, which by this means becomes the foundation of a great part of our knowledge of body. No man doubts of the power of aqua regia to dissolve gold, though perhaps he never himself made the experiment. In these therefore, and such like cases, we judge of the facts and operations of nature upon the mere ground of testimony. However, as we can always have recourse to experience where any doubt or scruple arises, this is justly considered as the true foundation of natural philosophy; being indeed the ultimate support upon which our assent rests, and whereto we appeal when the highest degree of evidence is required.

VII. But there are many facts that will not allow of an appeal to the senses; and in this case testimony is the true and only foundation of our judgments. All human actions, of whatever kind, when considered as already past, are of the nature here described; because, having now no longer any existence, both the facts themselves, and the circumstances attending them, can be known only from the relations of such as had sufficient opportunities of arriving at the truth. *Testimony* therefore is justly accounted a third ground of human judgment; and as from the other two we have deduced *scientifical* and *natural* knowledge, so we may from this derive *historical*; by which we mean, not merely a knowledge of the civil transactions of states and kingdoms, but of all facts whatsoever, where testimony is the ultimate foundation of our belief.

### *Of Reasoning in general, and the Parts of which it consists.*

It often happens in comparing ideas together that their agreement or disagreement cannot be discerned at first view, especially if they are of such a nature as not to admit of an exact application one to another. When, for instance, we compare two figures of a different make, in order to judge of their equality or inequality, it is plain, that by barely considering the figures themselves, we cannot arrive at an exact determination, because, by reason of their disagreeing forms, it is impossible so to put them together as that their several parts shall mutually coincide. Here then it becomes necessary to look out for some third idea that will admit of such an application as the present case requires, wherein if we succeed, all difficulties vanish, and the relation we are in quest of may be traced with ease. Thus right-lined figures are all reduced to squares, by means of which we can measure their areas, and determine exactly their agreement or disagreement in point of magnitude.

II. But how can any third idea serve to discover a relation between two others? The answer is, By being compared severally with these others, for such a comparison enables us to see how far the ideas with which this third is compared are connected or disjoined between themselves. In the example mentioned above of two right-lined figures, if we compare each of them with some square whose area is known, and find the one exactly equal to it, and the other less by a square inch, we immediately conclude that the area of the first figure is a square inch greater than that of the second. This manner of determining the relation between any two ideas, by the intervention of some third with which they may be compared, is that which we call *reasoning*; and is indeed the chief instrument by which we push on our discoveries, and enlarge our knowledge. The great art lies in finding out such intermediate ideas, as when compared with the others in the question will furnish evident and known truths; because, as will afterwards appear, it is only by means of them that we arrive at the knowledge of what is hidden and remote.

III. Hence it appears, that every act of reasoning necessarily includes three distinct judgments; two wherein the ideas whose relation we want to discover are severally compared with the middle idea, and a third, wherein they are themselves connected or disjoined, according to the result of that comparison. Now, as in the second part of logic, our judgments, when put into words, were called propositions, so here in the third part the expressions of our reasonings are termed *syllogisms*. And hence it follows, that as every act of reasoning implies three several judgments, so every syllogism must include three distinct propositions. When a reasoning is thus put into words, and appears in form of a syllogism, the intermediate idea made use of, to discover the agreement or disagreement we search for, is called the *middle term*; and the two ideas themselves, with which this third is compared, go by the name of the *extremes*.

IV. But as these things are best illustrated by examples, let us, for instance, set ourselves to inquire *whether men are accountable for their actions*. As the relation between the ideas of *man* and *accountableness* comes not within the immediate view of the mind, our first care must be to find out some third idea that will enable us the more easily to discover and trace it. A very small measure of reflection is sufficient to inform us, that no creature can be accountable for his actions, unless we suppose him capable of distinguishing the good from the bad; that is, unless we suppose him possessed of reason. Nor is this alone sufficient. For what would it avail him to know good from bad actions, if he had no freedom of choice, nor could avoid the one and pursue the other? Hence it becomes necessary to take in both considerations in the present case. It is at the same time equally apparent, that wherever there is this ability of distinguishing good from bad actions, and of pursuing the one and avoiding the other, there also a creature is accountable. We have then got a third idea, with which *accountableness* is inseparably connected, viz. *reason and liberty*; which are here to be considered as making up one complex conception. Let us now take this middle idea, and compare it with the other term in the question, viz. *man*, and we all know by experience that it may be affirmed of him. Having thus by means of the intermediate idea formed two several judgments, viz. "that man is possessed of reason and liberty;" and "that reason and liberty imply accountableness;" a third obviously and necessarily follows, viz. "that man is accountable for his actions." Here then we have a complete act of reasoning, in which, according to what has been already observed, there are three distinct judgments; two that may be stiled previous, inasmuch as they lead to the other, and arise from comparing the middle idea with the two ideas in the question: the third is a consequence of these previous acts, and flows from combining the extreme ideas between themselves. If now we put this reasoning into words, it exhibits what logicians term a syllogism; and, when proposed in due form, runs thus:

"Every creature possessed of reason and liberty is accountable for his actions.

"Man is a creature possessed of reason and liberty: therefore man is accountable for his actions."

V. In this syllogism we may observe, that there are three several propositions expressing the three judgments implied in the act of reasoning; and so disposed as to represent distinctly what passes within the mind in tracing the more distant relations of its ideas. The two first propositions answer the two previous judgments in reasoning, and are called the *premises*, because they are placed before the other. The third is termed the *conclusion*, as being gained in consequence of what was asserted in the premises. We are also to remember, that the terms expressing the two ideas whose relations we enquire after, as here *man* and *accountableness*, are in general called the *extremes*; and that the intermediate idea, by means of which the relation is traced, viz. "a creature possessed of reason and liberty," takes the name of the *middle term*. Hence it follows, that by the premises of a syllogism we are always to understand the two propositions where the middle term is severally compared with the extremes; for these constitute the previous judgments, whence the truth we are in quest of is by reasoning deduced. The conclusion is that other proposition, in which the extremes themselves are joined or separated agreeably to what appears upon the above comparison.

VI. The conclusion is made up of the extreme terms of the syllogism: and the extreme, which serves as the predicate of the conclusion, goes by the name of the *major term*: the other extreme, which makes the subject in the same proposition, is called the *minor term*. From this distinction of the extremes arises also a distinction between the premises, where these extremes are severally compared with the middle term. That proposition which compares the greater extreme, or the predicate of the conclusion, with the middle term, is called the *major proposition*: the other, wherein the same middle term is compared with the subject of the conclusion or lesser extreme, is called the *minor proposition*. All this is obvious from the syllogism already given, where the conclusion is, "Man is accountable for his actions." For here the predicate *accountable for his actions*, being connected with the middle term in the first of the two premises, "every creature possessed of reason and liberty is accountable for his actions," gives what we call the *major proposition*. In the second of the premises, "man is a creature possessed of reason and liberty," we find the lesser extreme, or subject of the conclusion, viz. *man*, connected with the same middle term, whence it is known to be the minor proposition. When a syllogism is proposed in due form, the major proposition is always placed first, the minor next, and the conclusion last.

VII. These things premised, we may in the general define reasoning to be an act or operation of the mind, deducing some unknown proposition from other previous ones that are evident and known. These previous propositions, in a simple act of reasoning, are only two in number, and it is always required that they be of themselves apparent to the understanding, insomuch that we assent to and perceive the truth of them as soon as proposed. In the syllogism given above, the premises are supposed to be self-evident truths; otherwise the conclusion could not be inferred by a single act of reasoning. If, for instance, in the major, "every creature possessed of reason and liberty is accountable for his actions," the connection between the subject and predicate could not be perceived by a bare attention to the ideas themselves; it is evident that this proposition would no less require a proof than the conclusion

deduced from it. In this case a new middle term must be sought for, to trace the connection here supposed; and this of course furnishes another syllogism, by which having established the proposition in question, we are then, and not before, at liberty to use it in any succeeding train of reasoning. And should it so happen that in this second essay there was still some previous proposition whose truth did not appear at first sight, we must then have recourse to a third syllogism, in order to lay open that truth to the mind, because so long as the premises remain uncertain, the conclusion built upon them must be so too. When, by conducting our thoughts in this manner, we at last arrive at some syllogism where the previous propositions are intuitive truths; the mind then rests in full security, as perceiving that the several conclusions it has passed through stand upon the immoveable foundation of self-evidence, and when traced to their source terminate in it.

VIII. We see, therefore, that in order to infer a conclusion by a single act of reasoning, the premises must be intuitive propositions. Where they are not, previous syllogisms are required; in which case reasoning becomes a complicated act, taking in a variety of successive steps. This frequently happens in tracing the more remote relations of our ideas; where many middle terms being called in, the conclusion cannot be made out but in consequence of a series of syllogisms following one another in train. But although in this concatenation of propositions, those that form the premises of the last syllogism are often considerably removed from self-evidence; yet if we trace the reasoning backwards, we shall find them the conclusions of previous syllogisms, whose premises approach nearer and nearer to intuition in proportion as we advance, and are found at last to terminate in it. And if, after having thus unravelled a demonstration, we take it the contrary way; and observe how the mind, setting out with intuitive perceptions, couples them together to form a conclusion; how, by introducing this conclusion into another syllogism, it still advances one step farther; and so proceeds, making every new discovery subservient to its future progress; we shall then perceive clearly, that reasoning, in the highest sense of that faculty, is no more than an orderly combination of those simple acts which we have already so fully explained.

IX. Thus we see, that reasoning, beginning with first principles, rises gradually from one judgment to another, and connects them in such manner, that every stage of the progression brings intuitive certainty along with it. And now at length we may clearly understand the definition given above of this distinguishing faculty of the human mind. Reason, we have said, is the ability of deducing unknown truths from principles or propositions that are already known. This evidently appears by the foregoing account, where we see that no proposition is admitted into a syllogism, to serve as one of the previous judgments on which the conclusion rests, unless it is itself a known and established truth, whose connection with self-evident principles has been already traced.

### *Of the several Kinds of Reasoning: and first, of that by which we determine the Genera and Species of Things.*

I. All the aims of human reason may in the general be reduced to these two: 1. To rank things under those universal ideas to which they truly belong; and, 2. To ascribe to them their several attributes and properties in consequence of that distribution.

II. One great aim of human reason is to determine the genera and species of things. We have seen in the first part of this treatise, how the mind proceeds in framing general ideas. We have also seen in the second part, how by means of these general ideas we come by universal propositions. Now as in these universal propositions we affirm some property of a genus or species, it is plain that we cannot apply this property to particular objects till we have first determined whether they are comprehended under that general idea of which the property is affirmed. Thus there are certain properties belonging to all *even* numbers, which nevertheless cannot be applied to any particular number, until we have first discovered it to be of the species expressed by that natural name. Hence reasoning begins with referring things to their several divisions and classes in the scale of our ideas; and as these divisions are all distinguished by particular names, we hereby learn to apply the terms expressing general conceptions to such particular objects as come under our immediate observation.

III. Now, in order to arrive at these conclusions, by which the several objects of perception are brought under general names, two things are manifestly necessary. First, that we take a view of the idea itself denoted by that general name, and carefully attend to the distinguishing marks which serve to characterize it. Secondly, that we compare this idea with the object under consideration, observing diligently wherein they agree or differ. If the idea is found to correspond with the particular object, we then without hesitation apply the general name; but if no such correspondence intervenes, the conclusion must necessarily take a contrary turn. Let us, for instance, take the number *eight*, and consider by what steps we are led to pronounce it an *even* number. First then, we call to mind the idea signified by the expression *an even number*, viz. that it is a number divisible into two equal parts. We then compare this idea with the number *eight*, and finding them manifestly to agree, see at once the necessity of admitting the conclusion. These several judgments therefore transferred into language, and reduced to the form of a syllogism, appear thus:

"Every number that may be divided into two equal parts is an even number:

"The number eight may be divided into two equal parts;

"Therefore the number eight is an even number."

IV. Here it may be observed, that where the general idea, to which particular objects are referred, is very familiar to the mind, and frequently in view; this reference, and the application of the general name, seem to be made without any apparatus of reasoning. When we see a horse in the fields, or a dog in the street, we readily apply the name of the species; habit, and a familiar acquaintance with a general idea, suggesting it instantaneously to the mind. We are not however to imagine on this account that the understanding departs from the usual rules of just thinking. A frequent repetition of acts begets a habit; and habits are attended with a certain promptness of execution, that prevents our observing the several steps and gradations by which any

course of action is accomplished. But in other instances, where we judge not by precontracted habits, as when the general idea is very complex, or less familiar to the mind, we always proceed according to the form of reasoning established above. A goldsmith, for instance, who is in doubt as to any piece of metal, whether it be of the species called gold, first examines its properties, and then comparing them with the general idea signified by that name, if he finds a perfect correspondence, no longer hesitates under what class of metals to rank it.

V. Nor let it be imagined that our researches here, because in appearance bound to the imposing of general names upon particular objects, are therefore trivial and of little consequence. Some of the most considerable debates among mankind, and such too as nearly regard their lives, interest, and happiness, turn wholly upon this article. Is it not the chief employment of our several courts of judicature to determine in particular instances what is law, justice, and equity? Of what importance is it in many cases to decide aright whether an action shall be termed *murder* or *manslaughter*? We see then that no less than the lives and fortunes of men depend often upon these decisions. The reason is plain. Actions, when once referred to a general idea, draw after them all that may be affirmed of that idea; insomuch that the determining the species of actions is all one with determining what proportion of praise or dispraise, commendation or blame, &c. ought to follow them. For as it is allowed that murder deserves death; by bringing any particular action under the head of murder, we of course decide the punishment due to it.

VI. But the great importance of this branch of reasoning, and the necessity of care and circumspection in referring particular objects to general ideas, is still further evident from the practice of the mathematicians. Every one who has read Euclid knows, that he frequently requires us to draw lines through certain points, and according to such and such directions. The figures thence resulting are often squares, parallelograms, or rectangles. Yet Euclid never supposes this from their bare appearance, but always demonstrates it upon the strictest principles of geometry. Nor is the method he takes in any thing different from that described above. Thus, for instance, having defined a square to be a figure bounded by four equal sides, joining together at right angles; when such a figure arises in any construction previous to the demonstration of a proposition, yet he never calls it by that name until he has shown that its sides are equal, and all its angles right ones. Now this is apparently the same form of reasoning we have before exhibited in proving *eight* to be an even number.

VII. Having thus explained the rules by which we are to conduct ourselves in ranking particular objects under general ideas, and shown their conformity to the practice and manner of the mathematicians; it remains only to observe that the true way of rendering this part of knowledge both easy and certain, is, by habituating ourselves to clear and determinate ideas, and keeping them steadily annexed to their respective names. For, as all our aim is to apply general words aright, if these words stand for invariable ideas that are perfectly known to the mind, and can be readily distinguished upon occasion, there will be little danger of mistake or error in our reasonings. Let us suppose that, by examining any object, and carrying our attention successively from one part to another, we have acquainted ourselves with the several particulars observable in it. If among these we find such as constitute some general idea, framed and settled beforehand by the understanding, and distinguished by a particular name, the resemblance thus known and perceived necessarily determines the species of the object, and thereby gives it a right to the name by which that species is called. Thus four equal sides joined together at right angles, make up the notion of a *square*. As this is a fixed and invariable idea, without which the general name cannot be applied; we never call any particular figure a *square* until it appears to have these several conditions; and contrarily, wherever a figure is found with these conditions, it necessarily takes the name of a *square*. The same will be found to hold in all our other reasonings of this kind, where nothing can create any difficulty but the want of settled ideas. If, for instance, we have not determined within ourselves the precise notion denoted by the word *man-slaughter*, it will be impossible for us to decide whether any particular action ought to bear that name: because, however nicely we examine the action itself, yet being strangers to the general idea with which it is to be compared, we are utterly unable to judge of their agreement or disagreement. But if we take care to remove this obstacle, and distinctly trace the two ideas under consideration, all difficulties vanish, and the resolution becomes both easy and certain.

VIII. Thus we see of what importance it is towards the improvement and certainty of human knowledge, that we accustom ourselves to clear and determinate ideas, and a steady application of words.

*Of Reasoning as it regards the Powers and Properties of Things, and the Relations of our general Ideas.*

I. We now come to the second great end which men have in view in their reasoning; namely, the discovering and ascribing to things their several attributes and properties. And here it will be necessary to distinguish between reasoning, as it regards the sciences, and as it concerns common life. In the sciences, our reason is employed chiefly about universal truths, it being by them alone that the bounds of human knowledge are enlarged. Hence the division of things into various classes, called otherwise *genera* and *species*. For these universal ideas being set up as the representatives of many particular things, whatever is affirmed of them may be also affirmed of all the individuals to which they belong. *Murder*, for instance, is a general idea, representing a certain species of human actions. Reason tells us the punishment due to it is *death*. Hence every particular action, coming under the notion of *murder*, has the punishment of *death* allotted to it. Here then we apply the general truth to some obvious instance; and this is what properly constitutes the reasoning of common life. For men, in their ordinary transactions and intercourse one with another, have, for the most part, to do only with particular objects. Our friends and relations, their characters and behaviour, the constitution of the several bodies that surround us, and the uses to which they may be applied, are what chiefly engage our attention. In all these, we reason about particular things; and the whole

result of our reasoning is, the applying the general truths of the sciences in the ordinary transactions of human life. When we see a viper, we avoid it. Wherever we have occasion for the forcible action of water to move a body that makes considerable resistance, we take care to convey it in such a manner that it shall fall upon the object with impetuosity. Now all this happens in consequence of our familiar and ready application of these two general truths. "The bite of a viper is mortal. Water, falling upon a body with impetuosity, acts very forcibly towards setting it in motion." In like manner, if we set ourselves to consider any particular character, in order to determine the share of praise or dispraise that belongs to it, our great concern is to ascertain exactly the proportion of virtue and vice. The reason is obvious. A just determination, in all cases of this kind, depends entirely upon an application of these general maxims of morality: "Virtuous actions deserve praise; vicious actions deserve blame."

II. Hence it appears that reasoning, as it regards common life, is no more than the ascribing the general properties of things to those several objects with which we are more immediately concerned, according as they are found to be of that particular division or class to which the properties belong. The steps then by which we proceed are manifestly these: First, we refer the object under consideration to some general idea or class of things. We then recollect the several attributes of that general idea. And, lastly, ascribe all those attributes to the present object. Thus in considering the character of Sempronius, if we find it to be of the kind called *virtuous*, when we at the same time reflect that a virtuous character is deserving of esteem, it naturally and obviously follows that Sempronius is so too. These thoughts put into a syllogism, in order to exhibit the form of reasoning here required, run thus:

"Every virtuous man is worthy of esteem.
"Sempronius is a virtuous man:
"Therefore Sempronius is worthy of esteem."

III. By this syllogism it appears that before we affirm any thing of a particular object, that object must be referred to some general idea. Sempronius is pronounced worthy of esteem only in consequence of his being a virtuous man, or coming under that general notion. Hence we see the necessary connection of the various parts of reasoning, and the dependence they have one upon another. The determining the genera and species of things is, as we have said, one exercise of human reason; and here we find that this exercise is the first in order, and previous to the other, which consists in ascribing to them their powers, properties, and relations. But when we have taken this previous step, and brought particular objects under general names; as the properties we ascribe to them are no other than those of the general idea, it is plain that in order to a successful progress in this part of knowledge, we must thoroughly acquaint ourselves with the several relations and attributes of these our general ideas. When this is done, the other part will be easy, and requires scarce any labour or thought, as being no more than an application of the general form of reasoning represented in the foregoing syllogism. Now, as we have already sufficiently shown how we are to proceed in determining the genera and species of things, which, as we have said, is the previous step to this second branch of human knowledge; all that is farther wanting towards a due explanation of it is, to offer some considerations as to the manner of investigating the general relations of our ideas. This is the highest exercise of the powers of the understanding, and that by means whereof we arrive at the discovery of universal truths; insomuch that our deductions in this way constitute that particular species of reasoning which we have before said regards principally the sciences.

IV. But that we may conduct our thoughts with some order and method, we shall begin with observing, that the relations of our general ideas are of two kinds: either such as immediately discover themselves, upon comparing the ideas one with another; or such as, being more remote and distant, require art and contrivance to bring them into view. The relations of the first kind furnish us with intuitive and self-evident truths: those of the second are traced by reasoning, and a due application of intermediate ideas. It is of this last kind that we are to speak here, having dispatched what was necessary with regard to the other in the second part. As, therefore, in tracing the more distant relations of things, we must always have recourse to intervening ideas, and are more or less successful in our researches according to our acquaintance with these ideas, and ability of applying them; it is evident that, to make a good reasoner, two things are principally required. First, An extensive knowledge of those intermediate ideas, by means of which things may be compared one with another. Secondly, The skill and talent of applying them happily in all particular instances that come under consideration.

V. In order to our successful progress in reasoning, we must have an extensive knowledge of those intermediate ideas by means of which things may be compared one with another. For, as it is not every idea that will answer the purpose of our inquiries, but only such as are peculiarly related to the objects about which we reason, so as, by a comparison with them, to furnish evident and known truths; nothing is more apparent than that the greater variety of conceptions we can call into view, the more likely we are to find some among them that will help us to the truths here required. And, indeed, it is found to hold in experience, that in proportion as we enlarge our views of things, and grow acquainted with the multitude of different objects, the reasoning faculty gathers strength: for, by extending our sphere of knowledge, the mind acquires a certain force and penetration, as being accustomed to examine the several appearances of its ideas, and observe what light they cast one upon another.

VI. This is the reason why, in order to excel remarkably in any one branch of learning, it is necessary to have at least a general acquaintance with the whole circle of arts and sciences. The truth of it is, all the various divisions of human knowledge are very nearly related among themselves, and, in innumerable instances, serve to illustrate and set off each other. And although it is not to be denied that, by an obstinate application to one branch of study, a man may make considerable progress, and acquire some degree of eminence in it; yet his views will be always narrow and contracted, and he will want that masterly discernment which not only enables us to pursue our discoveries with ease, but also in laying them open to others, to spread a certain brightness around them. But when our reasoning regards a particular science, it is further necessary that we

more nearly acquaint ourselves with whatever relates to that science. A general knowledge is a good preparation, and enables us to proceed with ease and expedition in whatever branch of learning we apply to. But then, in the minute and intricate questions of any science, we are by no means qualified to reason with advantage until we have perfectly mastered the science to which they belong.

VII. We come now to the second thing required, in order to a successful progress in reasoning; namely, the skill and talent of applying intermediate ideas happily in all particular instances that come under consideration. And here rules and precepts are of little service. Use and experience are the best instructors. For, whatever logicians may boast of being able to form perfect reasoners by book and rule, we find by experience, that the study of their precepts does not always add any great degree of strength to the understanding. In short, it is the habit alone of reasoning that makes a reasoner. And therefore the true way to acquire this talent is, by being much conversant in those sciences where the art of reasoning is allowed to reign in the greatest perfection. Hence it was that the ancients, who so well understood the manner of forming the mind, always began with mathematics, as the foundation of their philosophical studies. Here the understanding is by degrees habituated to truth, contracts insensibly a certain fondness for it, and learns never to yield its assent to any proposition but where the evidence is sufficient to produce full conviction. For this reason Plato has called mathematical demonstrations the cathartics or purgatives of the soul, as being the proper means to cleanse it from error, and restore that natural exercise of its faculties in which just thinking consists.

VIII. If therefore we would form our minds to a habit of reasoning closely and in train, we cannot take any more certain method than the exercising ourselves in mathematical demonstrations, so as to contract a kind of familiarity with them. Not that we look upon it as necessary that all men should be deep mathematicians; but that, having got the way of reasoning which that study necessarily brings the mind to, they may be able to transfer it to other parts of knowledge, as they shall have occasion.

IX. But although the study of mathematics be of all others the most useful to form the mind and give it an early relish of truth, yet ought not other parts of philosophy to be neglected. For there also we meet with many opportunities of exercising the powers of the understanding; and the variety of subjects naturally leads us to observe all those different turns of thinking that are peculiarly adapted to the several ideas we examine, and the truth we search after. A mind thus trained acquires a certain mastery over its own thoughts, insomuch that it can range and model them at pleasure, and call such into view as best suit its present designs. Now in this the whole art of reasoning consists; from among a great variety of different ideas to single out those that are most proper for the business in hand, and to lay them together in such order that from plain and easy beginnings, by gentle degrees, and a continued train of evident truths, we may be sensibly led on to such discoveries as at our first setting out appeared beyond the reach of human understanding. For this purpose, besides the study of mathematics before recommended, we ought to apply ourselves diligently to the reading of such authors as have distinguished themselves for strength of reasoning, and a just and accurate manner of thinking. For it is observable, that a mind exercised and seasoned to truth seldom rests satisfied in a bare contemplation of the arguments offered by others; but will be frequently assaying its own strength, and pursuing its discoveries upon the plan it is most accustomed to. Thus we insensibly contract a habit of tracing truth from one stage to another, and of investigating those general relations and properties which we afterwards ascribe to particular things, according as we find them comprehended under the abstract ideas to which the properties belong.

### *Of the Forms of Syllogisms.*

I. Hitherto we have contented ourselves with a general notion of syllogisms, and of the parts of which they consist. It is now time to enter a little more particularly into the subject, to examine their various forms, and lay open the rules of argumentation proper to each. In the syllogisms mentioned in the foregoing chapters, we may observe, that the middle term is the subject of the major proposition, and the predicate of the minor. This disposition, though the most natural and obvious, is not however necessary; it frequently happening, that the middle term is the subject in both the premises, or the predicate in both; and sometimes, directly contrary to its disposition in the foregoing examples, the predicate in the major, and the subject in the minor. Hence the distinction of syllogisms into various kinds, called *figures* by logicians. For figure, according to their use of the word, is nothing else but the order and disposition of the middle term in any syllogism. And as this disposition is, we see, fourfold, so the figures of syllogisms thence arising are four in number. When the middle term is the subject of the major proposition, and the predicate of the minor, we have what is called the *first figure:* As,

> "No work of God is bad;
> "The natural passions and appetites of men are the work of God:
> "Therefore none of them is bad."

If, on the other hand, it is the predicate of both the premises, the syllogism is said to be the *second figure:* As,

> "Whatever is bad is not the work of God:
> "All the natural passions and appetites of men are the work of God:
> "Therefore the natural passions and appetites of men are not bad.

Again, in the *third figure,* the middle term is the subject of the two premises: As,

> "All Africans are black:
> "All Africans are men:
> "Therefore some men are black."

And lastly, by making it the predicate of the major, and subject of the minor, we obtain syllogisms in the *fourth figure:* As,

> "The only being who ought to be worshipped is the Creator and Governor of the world:
> "The Creator and Governor of the world is God:
> "Therefore God is the only being who ought to be worshipped."

II. But, besides this fourfold distinction of syllogisms, there is also a farther subdivision of them in every figure, arising from the *quantity* and *quality,* as they are called, of the propositions. By

quantity we mean the consideration of propositions, as universal or particular; by quality, as affirmative or negative.

Now as, in all the several dispositions of the middle term, the propositions of which a syllogism consists may be either universal or particular, affirmative or negative; the due determination of these, and so putting them together as the laws of argumentation require, constitute what logicians call the *moods* of syllogisms. Of these moods there is a determinate number to every figure, including all the possible ways in which propositions differing in quantity or quality can be combined, according to any disposition of the middle term, in order to arrive at a just conclusion.

The first figure has only four legitimate moods. The major proposition in this figure must be universal, and the minor affirmative; and it has this property, that it yields conclusions of all kinds, affirmative and negative, universal and particular.

The second figure has also four legitimate moods. Its major proposition must be universal, and one of the premises must be negative. It yields conclusions both universal and particular, but all negative.

The third figure has six legitimate moods. Its minor must always be affirmative; and it yields conclusions both affirmative and negative: but all particular.—These are all the figures which were admitted by the inventors of syllogisms; and of which, so far as we know, the number of legitimate moods has been ascertained, and severally demonstrated. In every figure it will be found upon trial that there are sixty four different moods of syllogism; and he who thinks it worth while to construct so many in the fourth figure, always remembering that the middle term in each must be the predicate of the major and the subject of the minor proposition, will easily discern what number of these moods are legitimate, and give true conclusions.

Besides the rules that are proper to each figure, Aristotle has given some that are common to all, by which the legitimacy of syllogisms may be tried. These may be reduced to five:—1. There must be only three terms in a syllogism: as each term occurs in two of the propositions, it must be precisely the same in both; if it be not, the syllogism is said to have four terms, which makes a *vicious* syllogism. 2. The middle term must be taken universally in one of the premises. 3. Both premises must not be particular propositions, nor both negative. 4. The conclusion must be particular, if either of the premises be particular; and negative, if either of the premises be negative. 5. No term can be taken universally in the conclusion, if it be not taken universally in the premises.

For understanding the second and fifth of these rules, it is necessary to observe, that a term is said to be taken universally, not only when it is the subject of a universal proposition, but also when it is the predicate of a negative proposition. On the other hand, a term is said to be taken particularly, when it is either the subject of a particular or the predicate of an affirmative proposition.

III. The division of syllogisms according to mood and figure respects those especially which are known by the name of plain simple syllogisms; that is, which are bounded to three propositions, all simple, and where the extremes and middle term are connected, according to the rules laid down above. But as the mind is not tied down to any one precise form of reasoning, but sometimes makes use of more, sometimes of fewer premises, and often takes in compound and conditional propositions, it may not be amiss to take notice of the different forms derived from this source, and explain the rules by which the mind conducts itself in the use of them.

IV. When in any syllogism the major is a conditional proposition, the syllogism itself is termed *conditional*. Thus:

> "If there is a God he ought to be worshipped:
> "But there is a God:
> "Therefore he ought to be worshipped."

In this example, the major, or first proposition, is, we see, conditional, and therefore the syllogism itself is also of the kind called by that name. And here we are to observe, that all conditional propositions are made of two distinct parts: one expressing the condition upon which the predicate agrees or disagrees with the subject, as in this now before us, *if there is a God*; the other joining or disjoining thesaid predicate and subject, as here, *he ought to be worshipped.* The first of these parts, or that which implies the condition, is called the antecedent; the second, where we join or disjoin the predicate and subject, has the name of the consequent.

V. In all propositions of this kind, supposing them to be exact in point of form, the relation between the antecedent and consequent must ever be true and real; that is, the antecedent must always contain some certain and genuine condition, which necessarily implies the consequent; for otherwise the proposition itself will be false, and therefore ought not to be admitted into our reasonings. Hence it follows, that when any conditional proposition is assumed, if we admit the antecedent of that proposition, we must at the same time necessarily admit the consequent; but if we reject the consequent, we are in like manner bound to reject the antecedent. For, as the antecedent always expresses some condition which necessarily implies the truth of the consequent; by admitting the antecedent, we allow of that condition, and therefore ought also to admit the consequent. In like manner, if it appears that the consequent ought to be rejected, the antecedent evidently must be so too; because, as was just now demonstrated, the admitting of the antecedent would necessarily imply the admission also of the consequent.

VI. There are two ways of arguing in hypothetical syllogisms, which lead to a certain and unavoidable conclusion. For as the major is always a conditional proposition, consisting of an antecedent and a consequent; if the minor admits the antecedent, it is plain that the conclusion must admit the consequent. This is called arguing from the admission of the antecedent to the admission of the consequent, and constitutes that mood or species of hypothetical syllogisms which is distinguished in the schools by the name of the *modus ponens*, inasmuch as by it the whole conditional proposition, both antecedent and consequent, is established. Thus:

> "If God is infinitely wise, and acts with perfect freedom, he does nothing but what is best:

"But God is infinitely wise, and acts with perfect freedom:

"Therefore he does nothing but what is best."

Here we see the antecedent or first part of the conditional proposition is established in the minor, and the consequent or second part in the conclusion; whence the syllogism itself is an example of the *modus ponens*. But if now we on the contrary suppose that the minor rejects the consequent, then it is apparent that the conclusion must also reject the antecedent. In this case we are said to argue from the removal of the consequent to the removal of the antecedent, and the particular mood or species of syllogisms thence arising is called by logicians the *modus tollens*; because in it both antecedent and consequent are rejected or taken away; as appears by the following example:

"If God were not a Being of infinite goodness, neither would he consult the happiness of his creatures:

"But God does consult the happiness of his creatures:

"Therefore he is a being of infinite goodness."

VII. These two species take in the whole class of conditional syllogisms, and include all the possible ways of arguing that lead to a legitimate conclusion; because we cannot here proceed by a contrary process of reasoning, that is, from the removal of the antecedent to the removal of the consequent, or from the establishing of the consequent to the establishing of the antecedent. For, although the antecedent always expresses some real condition, which, once admitted, necessarily implies the consequent, yet it does not follow that there is therefore no other condition; and if so, then, after removing the antecedent, the consequent may still hold, because of some other determination that infers it. When we say, "If a stone is exposed some time to the rays of the sun, it will contract a certain degree of heat," the proposition is certainly true; and, admitting the antecedent, we must also admit the consequent. But as there are other by which a stone may gather heat, it will not follow, from the ceasing of the before-mentioned condition, that therefore the consequent cannot take place. In other words, we cannot argue: "But the stone has not been exposed to the rays of the sun; therefore neither has it any degree of heat:" inasmuch as there are a great many other ways by which heat might have been communicated to it. And if we cannot argue from the removal of the antecedent to the removal of the consequent, no more can we from the admission of the consequent to the admission of the antecedent: because, as the consequent may flow from a great variety of different suppositions, the allowing of it does not determine the precise supposition, but only that some one of them must take place. Thus in the foregoing proposition, "If a stone is exposed some time to the rays of the sun, it will contract a certain degree of heat;" admitting the consequent, viz. "that it has contracted a certain degree of heat," we are not therefore bound to admit the antecedent, "that it has been some time exposed to the rays of the sun;" because there are many other causes whence that heat may have proceeded. These two ways of arguing, therefore, hold not in conditional syllogisms.

VIII. As from the major's being a conditional proposition, we obtain the species of conditional syllogisms; so where it is a disjunctive proposition, the syllogism to which it belongs is also called *disjunctive*, as in the following example:

"The world is either self-existent, or the work of some finite, or of some infinite Being:

"But it is not self-existent, nor the work of a finite Being:

"Therefore it is the work of an infinite Being."

Now, a disjunctive proposition is that, where of several predicates, we affirm one necessarily to belong to the subject, to the exclusion of all the rest, but leave that particular one undetermined. Hence it follows, that as soon as we determine the particular predicate, all the rest are of course to be rejected; or if we reject all the predicates but one, that one necessarily takes place. When, therefore, in a disjunctive syllogism, the several predicates are enumerated in the major; if the minor establishes any one of these predicates, the conclusion ought to remove all the rest; or if, in the minor, all the predicates but one are removed, the conclusion must necessarily establish that one. Thus in the disjunctive syllogism given above, the major affirms one of the three predicates to belong to the earth, viz. self-existence, or that it is the work of a finite, or that it is the work of an infinite Being. Two of these predicates are removed in the minor, viz. self-existence, and the work of a finite being. Hence the conclusion necessarily ascribes to it the third predicate, and affirms that it is the work of an infinite Being. If now we give the syllogism another turn, insomuch that the minor may establish one of the predicates, by affirming the earth to be the production of an infinite Being: then the conclusion must remove the other two, asserting it to be neither self-existent, nor the work of a finite being. These are the forms of reasoning in these species of syllogisms, the justness of which appears at first sight: and that there can be no other is evident from the very nature of a disjunctive proposition.

IX. In the several kinds of syllogisms hitherto mentioned, we may observe, that the parts are complete; that is, the three propositions of which they consist are represented in form. But it often happens, that some one of the premises is not only an evident truth, but also familiar and in the minds of all men; in which case it is usually omitted, whereby we have an imperfect syllogism, that seems to be made up of only two propositions. Should we, for instance, argue in this manner:

"Every man is mortal:

"Therefore every king is mortal:"

the syllogism appears to be imperfect, as consisting but of two propositions. Yet it is really complete; only the minor [every king is a man] is omitted; and left to the reader to supply, as being a proposition so familiar and evident that it cannot escape him.

X. These seemingly imperfect syllogisms are called *enthymemes*; and occur very frequently in reasoning, especially where it makes a part of common conversation. Nay, there is a particular elegance in them, because not displaying the argument in all its parts, they leave somewhat to the exercise and invention of the mind. By this means we are put upon exerting ourselves, and seem to share in the discovery of what is proposed to us. Now this is the great secret of fine writing, so to frame and put together our thoughts, as to

give full play to the reader's imagination, and draw him insensibly into our very views and course of reasoning. This gives a pleasure not unlike to that which the author himself feels in composing. It besides shortens discourse, and adds a certain force and liveliness to our arguments, when the words in which they are conveyed favour the natural quickness of the mind in its operations, and a single expression is left to exhibit a whole train of thoughts.

XI. But there is another species of reasoning with two propositions, which seems to be complete in itself, and where we admit the conclusion without supposing any tacit or suppressed judgment in the mind, from which it follows syllogistically. This happens between propositions where the connection is such, that the admission of the one necessarily, and at the first sight, implies the admission also of the other. For, if it so falls out that the proposition on which the other depends is self-evident, we content ourselves with barely affirming it, and infer that other by a direct conclusion. Thus, by admitting an universal proposition, we are forced also to admit of all the particular propositions comprehended under it, this being the very condition that constitutes a proposition universal. If then that universal proposition chances to be self-evident, the particular ones follow of course, without any farther train of reasoning. Whoever allows, for instance, "that things equal to one and the same thing are equal to one another," must at the same time allow "that two triangles, each equal to a square whose side is three inches, are also equal between themselves." This argument, therefore,

> "Things equal to one and the same thing are equal to one another:
>
> "Therefore these two triangles, each equal to the square of a line of three inches, are equal between themselves;"

is complete in its kind, and contains all that is necessary towards a just and legitimate conclusion. For the first or universal proposition is self-evident, and therefore requires no farther proof. And as the truth of the particular is inseparably connected with that of the universal, it follows from it by an obvious and unavoidable consequence.

XII. Now, in all cases of this kind, where propositions are deduced one from another, on account of a known and evident connection, we are said to reason by immediate consequence. Such a coherence of propositions manifest at first sight, and forcing itself upon the mind, frequently occurs in reasoning. Logicians have explained at some length the several suppositions upon which it takes place, and allow of all immediate consequences that follow in conformity to them. It is however observable, that these arguments, though seemingly complete, because the conclusion follows necessarily from the single proposition that goes before, may yet be considered as real enthymemes, whose major, which is a conditional proposition, is wanting. The syllogism but just-mentioned, when represented, according to this view, will run as follows:

> "If things equal to one and the same thing are equal to one another; these two triangles, each equal to a square whose side is three inches, are also equal between themselves.
>
> "But things equal to one and the same thing are equal to one another:
>
> "Therefore also these triangles, &c. are equal between themselves."

This observation will be found to hold in all immediate consequences whatsoever, insomuch that they are in fact no more than enthymemes of hypothetical syllogisms. But then it is particular to them, that the ground on which the conclusion rests, namely its coherence with the minor, is of itself apparent, and seen immediately to flow from the rules and reasons of logic.

XIII. The next species of reasoning we shall take notice of here is what is commonly known by the name of a *sorites*. This is a way of arguing, in which a great number of propositions are so linked together, that the predicate of one becomes continually the subject of the next following, until at last a conclusion is formed, by bringing together the subject of the first proposition, and the predicate of the last. Of this kind is the following argument:

> "God is omnipotent:
>
> "An omnipotent being can do every thing possible:
>
> "He that can do every thing possible, can do whatever involves not a contradiction:
>
> "Therefore God can do whatever involves not a contradiction:

This particular combinaton of propositions may be continued to any length we please, without in the least weakening the ground upon which the conclusion rests. The reason is, because the sorites itself may be resolved into as many simple syllogisms as there are middle terms in it; where this is found universally to hold, that when such a resolution is made, and the syllogisms are placed in train, the conclusion of the last in the series is also the conclusion of the sorites. This kind of argument, therefore, as it serves to unite several syllogisms into one, must stand upon the same foundation with the syllogisms of which it consists, and is indeed, properly speaking, no other than a compendious way of reasoning syllogistically.

XIV. What is here said of plain simple propositions may be as well applied to those that are conditional; that is, any number of them may be so joined together in a series, that the consequent of one shall become continually the antecedent of the next following; in which case, by establishing the antecedent of the first proposition, we establish the consequent of the last, or by removing the last consequent remove also the first antecedent. This way of reasoning is exemplified in the following argument:

> "If we love any person, all emotions of hatred towards him cease:
>
> "If all emotions of hatred towards a person cease, we cannot rejoice in his misfortunes:
>
> "If we rejoice not at his misfortunes, we certainly wish him no injury:
>
> "Therefore, if we love a person, we wish him no injury."

It is evident that this sorites, as well as the last, may be resolved into a series of distinct syllogisms, with this only difference, that here the syllogisms are all conditional.

XV. The last species of syllogism we shall take notice of in this chapter is that commonly distinguished by the name of a *dilemma*. A dilemma is an argument by which we endeavour to prove the absurdity or falsehood of some assertion. In order to this, we assume a conditional

proposition, the antecedent of which is the assertion to be disproved, and the consequent a disjunctive proposition, enumerating all the possible suppositions upon which that assertion can take place. If then it appears, that all these several suppositions ought to be rejected, it is plain that the antecedent or assertion itself must be so too. When therefore such a proposition as that before mentioned is made the major of any syllogism; if the minor rejects all the suppositions contained in the consequent, it follows necessarily, that the conclusion ought to reject the antecedent, which, as we have said, is the very assertion to be disproved. This particular way of arguing is that which logicians call a *dilemma*; and from the account here given of it, it appears that we may in the general define it to be a hypothetical syllogism, where the consequent of the major is a disjunctive proposition, which is wholly taken away or removed in the minor. Of this kind is the following:

> "If God did not create the world perfect in its kind, it must either proceed from want of inclination, or from want of power:
>
> "But it could not proceed either from want of inclination or from want of power:
>
> "Therefore he created the world perfect in its kind."
>
> Or, which is the same thing: "It is absurd to say that he did not create the world perfect in its kind."

XVI. The nature then of a dilemma is universally this. The major is a conditional proposition, whose consequent contains all the several suppositions upon which the antecedent can take place. As therefore these suppositions are wholly removed in the minor, it is evident that the antecedent must be so too; insomuch that we here always argue from the removal of the consequent to the removal of the antecedent. That is, a dilemma is an argument in the *modus tollens* of hypothetical syllogisms, as logicians love to speak. Hence it is plain, that if the antecedent of the major is an affirmative proposition, the conclusion of the dilemma will be negative; but if it is a negative proposition, the conclusion will be affirmative.

### *Of Induction.*

All reasoning proceeds ultimately from first truths, either self-evident or taken for granted; and the first truths of syllogistic reasonings are general propositions. But except in the mathematics, and such other sciences as, being conversant about mere ideas, have no immediate relation to things without the mind, we cannot assume as truths propositions which are general. The mathematician indeed may be considered as taking his ideas from the beginning in their general form.—Every proposition composed of such ideas is therefore general; and those which are theoretic are reducible to two parts or terms, a predicate, and a subject, with a copula generally affirmative. If the agreement or the relation between the two terms be not immediate and self-evident, he has recourse to an axiom, which is a proposition still more general, and which supplies him with a third or middle term. This he compares first with the predicate, and then with the subject, or *vice versa*. These two comparisons, when drawn out in form, make two propositions, which are called the premises; and if they happen to be immediate and self-evident, the conclusion, consisting of the terms of the question proposed, is said to be demonstrated. This method of reasoning is conducted exactly in the syllogistic form explained in the preceding chapter.

But in sciences which treat of things external to the mind, we cannot assume as first principles the most general propositions, and from them infer others less and less general till we descend to particulars. The reason is obvious. Every thing in the universe, whether of mind or body, presents itself to our observation in its individual state; so that perception and judgment employed in the investigation of truth, whether physical, metaphysical, moral or historical, have in the first place to encounter with *particulars*. "With these reason begins, or should begin, its operations. It observes, tries, canvasses, examines, and compares them together, and judges of them by some of those native evidences and original lights which, as they are the first and indispensable inlets of knowledge to the mind, have been called the primary principles of truth. See METAPHYSICS.

"By such acts of observation and judgment, diligently practised and frequently repeated, on many individuals of the same class, or of a similar nature, noting their agreements, marking their differences however minute, and rejecting all instances which, however similar in appearance, are not the effect of the same, *reason*, with much labour and attention, extracts some general laws respecting the powers, properties, qualities, actions, passions, virtues, and relations of real things. This is no hasty, premature, notional abstraction of the mind, by which images and ideas are formed that have no archetypes in nature: it is a rational, operative, experimental process, instituted and executed upon the constitution of beings which in part compose the universe. By this process *reason* advances from particulars to generals, from less general to more general, till by a series of slow progression, and by regular degrees, it arrive at the most general notions called *forms* or *formal causes*. And by affirming or denying a genus of a species, or an accident of a substance or class of substances, through all the stages of the gradation we form conclusions, which, if logically drawn, are *axioms*, or general propositions ranged one above another, till they terminate in those that are *universal*." See INDUCTION.

### *Of Demonstration.*

I. Having dispatched what seemed necessary to be said with regard to the two methods of direct reasoning, *induction* and *syllogism*; we now proceed to consider the laws of demonstration. And here it must be acknowledged, that in strict demonstration, which removes from the mind all possibility of doubt or error, the inductive method of reasoning can have no place. When the experiments and observations from which the general conclusion is drawn are numerous and extensive, the result of this mode of reasoning is moral certainty; and could the induction be made complete, it would be absolute certainty, equally convincing with mathematical demonstration. But however numerous and extensive the observations and experiments may be upon which an inductive conclusion is established, they must of necessity

come short of the number and extent of nature; which, in some cases, by its immensity, will defeat all possibility of their co-extension; and, in others, by its distance, lies out of the reach of their immediate application. Though truth does not appear in all other departments of learning with that bold and resistless conviction with which it presides in the mathematical science, it shines through them all, if not interrupted by prejudice or perverted by error, with a clear and useful, though inferior strength. And as it is not necessary for the general safety or convenience of a traveller, that he should always enjoy the heat and splendour of a mid-day sun, whilst he can with more ease pursue his journey under the weaker influence of a morning or an evening ray; so it is not requisite, for the various concerns and purposes of life, that men should be led by truth of the most redundant brightness. Such truth is to be had only in those sciences which are conversant about ideas and their various relations; where every thing being certainly what it appears to be, definitions and axioms arise from mere intuition. Here syllogism takes up the process from the beginning; and by a sublime intellectual motion advances from the simplest axioms to the most complicated speculations, and exhibits truth springing out of its first and purest elements, and spreading on all sides into a system of science. As each step in the progress is syllogistic, we shall endeavour to explain the use and application of syllogisms in this species of reasoning.

We have seen, that in all the different appearances they put on, we still arrive at a just and legitimate conclusion; now it often happens, that the conclusion of one syllogism becomes a previous proposition in another; by which means great numbers of them are sometimes linked together in a series, and truths are made to follow one another in train. And as in such a concatenation of syllogisms all the various ways of reasoning that are truly conclusive may be with safety introduced; hence it is plain, that in deducing any truth from its first principles, especially where it lies at a considerable distance from them, we are at liberty to combine all the several kinds of syllogisms above explained, according as they are found best to suit the end and purpose of our inquiries. When a proposition is thus by means of syllogisms collected from others more evident and known, it is said to be proved; so that we may in the general define the proof of a proposition to be a syllogism, or series of syllogisms, collecting that proposition from known and evident truths. But more particularly, if the syllogisms of which the proofs consist admit of no premises but definitions self-evident truths, and propositions already established, then is the argument so constituted called a *demonstration*; whereby it appears that demonstrations are ultimately founded on definitions, and self-evident propositions.

II. All syllogisms whatsoever, whether compound, multiform, or defective, are reducible to plain simple syllogisms in some one of the four figures. But this is not all. Syllogisms of the first figure, in particular, admit of all possible conclusions: that is, any propositions whatsoever, whether an universal affirmative or universal negative, a particular affirmative or particular negative, which four-fold division embraces all their varieties; any one of these may be inferred by virtue of some syllogism in the first figure. By this means it happens that the syllogisms of all the other figures are reducible also to syllogisms of the first figure, and may be considered as standing on the same foundation with them. We cannot here demonstrate and explain the manner of this reduction, because it would too much swell the bulk of this article. It is enough to take notice, that the thing is universally known and allowed among logicians, to whose writings we refer such as desire further satisfaction in this matter. This then being laid down, it is plain that any demonstration whatsoever may be considered as composed of a series of syllogisms all in the first figure. For, since all the syllogisms that enter the demonstration are reducible to syllogisms of some one of the four figures; and since the syllogisms of all the other figures are further reducible to syllogisms of the first figure, it is evident, that the whole demonstration may be resolved into a series of these last syllogisms. Let us now, if possible, discover the ground upon which the conclusion rests in syllogisms of the first figure; because, by so doing, we shall come at an universal principle of certainty, whence the evidence of all demonstrations in all their parts may be ultimately derived.

III. The rules then of the first figure are briefly these: The middle term is the subject of the major proposition, and the predicate of the minor. The major is always an universal proposition, and the minor always affirmative. Let us now see what effect these rules will have in reasoning. The major is an universal proposition, of which the middle term is the subject, and the predicate of the conclusion the predicate. Hence it appears, that in the major the predicate of the conclusion is always affirmed or denied universally of the middle term. Again, the minor is an affirmative proposition, whereof the subject of the conclusion is the subject, and the middle term the predicate. Here then the middle term is affirmed of the subject of the conclusion; that is, the subject of the conclusion is affirmed to be comprehended under, or to make a part of, the middle term. Thus then we see what is done in the premises of a syllogism of the first figure. The predicate of the conclusion is universally affirmed or denied of some idea. The subject of the conclusion is affirmed to be or to make a part of that idea. Hence it naturally and unavoidably follows, that the predicate of the conclusion ought to be affirmed or denied of the subject. To illustrate this by an example, we shall resume one of the syllogisms of the first chapter.

> "Every creature possessed of reason and liberty is accountable for his actions:
>
> "Man is a creature possessed of reason and liberty:
>
> "Therefore man is accountable for his actions."

Here, in the first proposition, the predicate of the conclusion, *accountableness*, is affirmed of all creatures that have reason and liberty. Again, in the second proposition, *man*, the subject of the conclusion, is affirmed to be or to make a part of this class of creatures. Hence the conclusion necessarily and unavoidably follows, viz. that man is accountable for his actions; because if reason and liberty be that which constitutes a creature accountable, and man has reason and liberty, it is plain he has that which constitutes him accountable. In like manner, where the major is a negative proposition, or denies the predicate of the conclusion universally of the

middle term, as the minor always asserts the subject of the conclusion to be or make a part of that middle term, it is no less evident that the predicate of the conclusion ought in this case to be denied of the subject. So that the ground of reasoning, in all syllogisms of the first figure, is manifestly this: "Whatever may be affirmed universally of any idea, may be affirmed of every or any number of particulars comprehended under that idea." And again: "Whatever may be denied universally of any idea, may be in like manner denied of every or any number of its individuals." These two propositions are called by logicians the *dictum de omni* and *dictum de nullo*; and are indeed the great principles of syllogistic reasoning, inasmuch as all conclusions whatsoever either rest immediately upon them, or upon propositions deduced from them. But what adds greatly to their value is, that they are really self-evident truths, and such as we cannot gainsay without running into an express contradiction. To affirm, for instance, that no man is perfect, and yet argue that some men are perfect; or to say that all men are mortal, and yet that some men are not mortal, is to assert a thing to be and not to be at the same time.

IV. And now we may affirm, that, in all syllogisms of the first figure, if the premises are true, the conclusion must needs be true. If it be true that the predicate of the conclusion, whether affirmative or negative, agrees universally to some idea; and if it be also true that the subject of the conclusion is a part of or comprehended under that idea; then it necessarily follows, that the predicate of the conclusion agrees also to the subject. For to assert the contrary, would be to run counter to some one of the two principles before established; that is, it would be to maintain an evident contradiction. And thus we are come at last to the point we have all along been endeavouring to establish; namely, that every proposition which can be demonstrated is necessarily true. For, as every demonstration may be resolved into a series of syllogisms all in the first figure; and as in any one of these syllogisms, if the premises are true, the conclusion must needs be so too; it evidently follows, that if all the several premises are true, all the several conclusions are so, and consequently the conclusion also of the last syllogism, which is always the proposition to be demonstrated. Now that all the premises of a demonstration are true, will easily appear from the very nature and definition of that form of reasoning. A demonstration, as we have said, is a series of syllogisms, all whose premises are either definitions self-evident truths, or propositions already established. Definitions are identical propositions, wherein we connect the description of an idea with the name by which we choose to have that idea called, and therefore as to their truth there can be no dispute. Self-evident propositions appear true of themselves, and leave no doubt or uncertainty in the mind. Propositions before established are no other than conclusions gained by one or more steps from definitions and self-evident principles, that is, from true premises, and therefore must needs be true. Whence all the previous propositions of a demonstration being, we see, manifestly true; the last conclusion, or proposition to be demonstrated must be so too. So that demonstration not only leads to certain truth, but we have here also a clear view of the ground and foundation of that certainty. For as, in demonstrating, we may be said to do nothing more than combine a series of syllogisms together, all resting on the same bottom; it is plain that one uniform ground of certainty runs through the whole, and that the conclusions are every where built upon some one of the two principles before established, as the foundation of all our reasoning. These two principles are easily reduced into one, and may be expressed thus: "Whatever predicate, whether affirmative or negative, agrees universally to any idea; the same must needs agree to every or any number of individuals comprehended under that idea." And thus at length we have, according to our first design, reduced the certainty of demonstration to one simple and universal principle; which carries its own evidence along with it, and which is indeed the ultimate foundation of all syllogistic reasoning.

V. Demonstration therefore serving as an infallible guide to truth, and standing on so sure and unalterable a basis, we may now venture to assert, that the rules of logic furnish a sufficient criterion for the distinguishing between truth and falsehood. For since every proposition that can be demonstrated is necessarily true, he is able to distinguish truth from falsehood who can with certainty judge when a proposition is truly demonstrated. Now, a demonstration is, as we have said, nothing more than a concatenation of syllogisms, all whose premises are definitions, self-evident truths, or propositions previously established. To judge therefore of the validity of a demonstration, we must be able to distinguish whether the definitions that enter it are genuine, and truly descriptive of the ideas they are meant to exhibit: whether the propositions assumed without proofs as intuitive truths have really that self-evidence to which they lay claim: whether the syllogisms are drawn up in due form, and agreeable to the laws of argumentation: in fine, whether they are combined together in a just and orderly manner, so that no demonstrable propositions serve any where as premises unless they are conclusions of previous syllogisms. Now, it is the business of logic, in explaining the several operations of the mind, fully to instruct us in all these points. It teaches the nature and end of definitions, and lays down the rules by which they ought to be framed. It unfolds the several species of propositions, and distinguishes the self-evident from the demonstrable. It delineates also the different forms of syllogisms, and explains the laws of argumentation proper to each. In fine, it describes the manner of combining syllogisms, so as that they may form a train of reasoning, and lead to the successive discovery of truth. The precepts of logic, therefore, as they enable us to judge with certainty when a proposition is duly demonstrated, furnish a sure criterion for the distinguishing between truth and falsehood.

VI. Perhaps it may be objected, that demonstration is a thing very rare and uncommon, as being the prerogative of but a few sciences, and therefore the criterion here given can be of no great use. But wherever, by the bare contemplation of our ideas, truth is discoverable, there also demonstration may be attained. Now that is an abundantly sufficient criterion which enables us to judge with certainty in all cases where the knowledge of truth comes within our reach; for with discoveries that lie beyond the limits of the human mind we have, properly, no business or concernment.

When a proposition is demonstrated, we are certain of its truth. When, on the contrary, our ideas are such as have no visible connection or repugnance, and therefore furnish not the proper means of tracing their agreement or disagreement, there we are sure that scientifical knowledge is not attainable. But where there is some foundation of reasoning, which yet amounts not to the full evidence of demonstration, there the precepts of logic, by teaching us how to determine aright of the degree of proof, and of what is still wanting to render it full and complete, enable us to make a due estimate of the measures of probability, and to proportion our assent to the grounds on which the proposition stands. And this is all we can possibly arrive at, or even so much as hope for, in the exercise of faculties so imperfect and limited as ours.

VII. Before we conclude this chapter, it may not be improper to take notice of the distinction of demonstration into *direct* and *indirect*. A direct demonstration is, when, beginning with definitions, self evident propositions, or known and allowed truths, form a train of syllogisms, and combine them in an orderly manner, continuing the series through a variety of successive steps, until at last we arrive at a syllogism whose conclusion is the proposition to be demonstrated. Proofs of this kind leave no doubt or uncertainty behind them; because all the several premises being true, the conclusions must be so too, and of course the very last conclusion or proposition to be proved. The other species of demonstration is the *indirect*, or as it is sometimes called, the *apogogical*. The manner of proceeding here is, by assuming a proposition which directly contradicts that we mean to demonstrate; and thence, by a continued train of reasoning, in the way of a direct demonstration, deducing some absurdity or manifest untruth. For hereupon we conclude, that the proposition assumed was false; and thence again, by an immediate consequence, that the proposition to be demonstrated is true. Thus Euclid, in his third book, being to demonstrate that circles which touch one another inwardly have not the same centre, assumes the direct contrary to this, viz. that they have the same centre; and thence, by an evident train of reasoning, proves, that a part is equal to the whole. The supposition therefore leading to this absurdity he concludes to be false, viz. that circles touching one another inwardly have the same centre; and thence again immediately infers, that they have not the same centre.

VIII. Now, because this manner of demonstration is accounted by some not altogether so clear and satisfactory; we shall therefore endeavour to show, that it equally with the other leads to truth and certainty. Two propositions are said to be *contradictory* one of another, when that which is asserted to be in the one is asserted not to be in the other. Thus the propositions, Circles that touch one another inwardly have the same centre, and, Circles that touch one another inwardly have not the same centre, are contradictories, because the second asserts the direct contrary of what is asserted in the first. Now, in all contradictory propositions, this holds universally, that one of them is necessarily true, and the other necessarily false. For, if it be true, that circles which touch one another inwardly have not the same centre; it is unavoidably false, that they have the same centre. On the other hand, if it be false that they have the same centre, it is necessarily true that they have not the same centre. Since therefore it is impossible for them to be both true or both false at the same time; it unavoidably follows, that one is necessarily true and the other necessarily false. This then being allowed, which is indeed self-evident; if any two contradictory propositions are assumed, and one of them can by a clear train of reasoning be demonstrated to be false, it necessarily follows that the other is true. For, as the one is necessarily true, and the other necessarily false; when we come to discover which is the false proposition, we thereby also know the other to be true.

IX. Now this is precisely the manner of an indirect demonstration, as is evident from the account given of it above. For there we assume a proposition which directly contradicts that we mean to demonstrate; and, having by a continued series of proofs shown it to be false, thence infer that its contradictory, or the proposition to be demonstrated, is true. As, therefore, this last conclusion is certain and unavoidable; let us next inquire after what manner we come to be satisfied of the falsehood of the assumed proposition, that so no possible doubt may remain as to the force and validity of demonstrations of this kind. The manner then is plainly this: Beginning with the assumed proposition, we, by the help of definitions, self-evident truths, or propositions already established, continue a series of reasoning, in the way of a direct demonstration, until at length we arrive at some absurdity or known falsehood. Thus Euclid, in the example before-mentioned, from the supposition that circles touching one another inwardly have the same centre, deduces, that a part is equal to the whole. Since, therefore, by a due and orderly process of reasoning, we come at last to a false conclusion; it is manifest, that all the premises cannot be true: for, were all the premises true, the last conclusion must be so too, by what has been before demonstrated. Now, as to all the other premises made use of in the course of reasoning, they are manifest and known truths by supposition, as being either definitions, self-evident propositions, or truths previously established. The assumed proposition is that only as to which any doubt or uncertainty remains. That alone, therefore, can be false; and indeed, from what has been already shown, must unavoidably be so. And thus we see that in indirect demonstrations, two contradictory propositions being laid down, one of which is demonstrated to be false, the other, which is always the proposition to be proved, must necessarily be true; so that here, as well as in the direct way of proof, we arrive at a clear and satisfactory knowledge of truth.

X. This is universally the method of reasoning in all apogogical or indirect demonstrations. But if any proposition is assumed, from which, in a direct train of reasoning, we can deduce its contradictory, the proposition so assumed is false, and the contradictory one true. For, if we suppose the assumed proposition to be true, then, since all the other premises that enter the demonstration are also true, we shall have a series of reasoning consisting wholly of true premises; whence the last conclusion or contradictory of the assumed proposition must be true likewise: so that by this means we should have two contradictory propositions both true at the same time; which is manifestly impossible. The assumed proposition, there-

fore, whence this absurdity flows, must necessarily be false; and consequently its contradictory, which is here the proposition deduced from it, must be true. If then any proposition is proposed to be demonstrated, and we assume the contradictory of that proposition, and thence directly infer the proposition to be demonstrated; by this very means we know that the proposisition so inferred is true. For, since from an assumed proposition we have deduced its contradictory, we are thereby certain that the assumed proposition is false; and if so, then its contradictory, or that deduced from it, which in this case is the same with the proposition to be demonstrated, must be true.

XI. We have a curious instance of this in the twelfth proposition of the ninth book of the Elements. Euclid there proposes to demonstrate, "that in any series of numbers, rising from unity in geometrical progression, all the prime numbers that measure the last term in the series will also measure the next after unity." In order to this, he assumes the contradictory of the proposition to be demonstrated; namely, "that some prime number measuring the last term in the series does not measure the next after unity," and thence, by a continued train of reasoning, proves that it actually does measure it. Hereupon he concludes the assumed proposition to be false; and that which is deduced from it or its contradictory, which is the very proposition he proposed to demonstrate, to be true. Now that this is a just and conclusive way of reasoning, is abundantly manifest from what we have so clearly established above. Whence it appears, how necessary some knowledge of the rules of logic is, to enable us to judge of the force, justness, and validity of demonstrations. For, though it is readily allowed, that by the mere strength of our natural faculties we can at once discern, that of two contradictory propositions, the one is necessarily true, and the other necessarily false; yet when they are so linked together in a demonstration, as that the one serves as a previous proposition, whence the other is deduced, it does not so immediately appear, without some knowledge of the principles of logic, why that alone, which is collected by reasoning, ought to be embraced as true, and the other, whence it is collected, to be rejected as false.

XII. Having thus sufficiently evinced the certainty of demonstration in all its branches, and shown the rules by which we ought to proceed, in order to arrive at a just conclusion, according to the various ways of arguing made use of; it is needless to enter upon a particular consideration of those several species of false reasoning which logicians distinguish by the name of *sophisms*. He that thoroughly understands the form and structure of a good argument, will of himself readily discern every deviation from it. And although *sophisms* have been divided into many classes, which are all called by sounding names, that therefore carry in them much appearance of learning; yet are the errors themselves so very palpable and obvious, that it would be lost labour to write for a man capable of being misled by them.

The utility of logic has of late been much disputed; and the comparative disrepute into which it is fallen has arisen from very natural causes. The art of syllogism is admirably calculated for wrangling; and it was often and successfully used by the schoolmen to keep in countenance the absurdities of the Romish church. Under their management it produced numberless disputes, and numberless sects, who fought against each other with much animosity without gaining or losing ground: but it did nothing considerable for the benefit of human life, whilst the method of induction has improved arts and increased knowledge. It is no wonder, therefore, that the excessive admiration of Aristotle, which continued for so many ages, should end in an undue contempt; and that the high esteem of logic, as the grand engine of science, should at last make way for too unfavourable an opinion, which seems now prevalent, of its being unworthy of a place in a liberal education. Men rarely leave one extreme without running into the contrary: those who think according to the fashion will be as prone to go into the present extreme as their grandfathers were to go into the former; and even they who in general think for themselves, when they are offended at the abuse of any thing, are too apt to entertain prejudices against the thing itself. "In practice (says the learned Warburton), logic is more a trick than a science, formed rather to amuse than to instruct. And in some sort we may apply to the art of syllogism what a man of wit says of rhetoric, that it only tells us how to name those tools which nature had before put into our hands. In the service of chicane indeed, it is a mere juggler's knot, now fast, now loose; and the schools where this legerdemain was exercised in great perfection are full of the stories of its wonders." The authority of Warburton is great; but it may be counterbalanced by another which, on subjects of this nature, is confessedly greater.

"Laying aside prejudice, whether fashionable or unfashionable, let us consider (says Dr. Read) whether logic is or may be made subservient to any good purpose. Its professed end is to teach men to think, to judge, and to reason, with precision and accuracy. No man will say that this is a matter of little importance: the only thing therefore that can admit of doubt is, whether it can be taught?

"To resolve this doubt, it may be observed, that our rational faculty is the gift of God, given to men in very different measures: some have a large portion, some a less; and where there is a remarkable defect of the natural power, it cannot be supplied by any culture. But this natural power, even where it is the strongest, may lie dead for want of the means of improvement. Many a savage may have been born with as good faculties as a Newton, a Bacon, or an Aristotle; but their talents were buried by having never been put to use, whilst those of the philosophers were cultivated to the best advantage. It may likewise be observed, that the chief mean of improving our rational power is the vigorous exercise of it in various ways and on different subjects, by which the habit is acquired of exercising it properly. Without such exercise, and good sense over and above, a man who has studied logic all his life may be only a petulant wrangler, without true judgment or skill of reasoning in any science."

This must have been Locke's meaning, when in his Thoughts on Education he says, "If you would have your son to reason well, let him read Chillingworth." The state of things is much altered since Locke wrote: logic has been much improved chiefly by his writings; and yet much

less stress is laid upon it, and less time consumed in its study. His counsel, therefore, was judicious and seasonable; to wit, that the improvement of our reasoning power is to be expected much more from an intimate acquaintance with the authors who reason best, than from studying voluminous systems of school logic. But if he had meant, that the study of logic was of no use, nor deserved any attention, he surely would not have taken the pains to make so considerable an addition to it by his Essay on the Human Understanding, and by his Thoughts on the Conduct of the Understanding, nor would he have remitted his pupil to Chillingworth, the acutest logician as well as the best reasoner of his age."

There is no study better fitted to exercise and strengthen the reasoning powers than that of the mathematical sciences; because there is no other branch of science which gives such scope to long and accurate trains of reasoning, or in which there is so little room for authority or prejudice of any kind to give a false bias to the judgment. When a youth of moderate parts begins to study Euclid, every thing is new to him: his apprehension is unsteady; his judgment is feeble, and rests partly upon the evidence of the thing, and partly upon the authority of his teacher. But every time he goes over the definitions, the axioms, the elementary propositions, more light breaks in upon him; and as he advances, the road of demonstration becomes smooth and easy: he can walk in it firmly and take wider steps, till at last he acquires the habit not only of understanding a demonstration, but of discovering and demonstrating mathematical truths.

It must indeed be confessed, that a man without the rules of logic may acquire a habit of reasoning justly in mathematics, and perhaps in any other science. Good sense, good examples, and assiduous exercise, may bring a man to reason justly and acutely in his own profession without rules. But whoever thinks that from this concession he may infer the inutility of logic, betrays by this inference a great want of that art; for he might as well infer, because a man may go from Edinburgh to London by the way of Paris, that therefore any other road is useless.

There is perhaps no art which may not be acquired, in a very considerable degree, by example and practice, without reducing it to rules. But practice joined with rules may carry a man forward in his art farther and more quickly than practice without rules.—Every ingenious artist knows the utility of having his art reduced to rules, and thereby made a science. By rules he is enlightened in his practice, and works with more assurance. They enable him sometimes to correct his own errors, and often to detect the errors of others; and he finds them of great use to confirm his judgment, to justify what is right, and to condemn what is wrong. Now mathematics are the noblest praxis of logic. Through them we may perceive how the stated forms of syllogism are exemplified in one subject, namely the predicament of quantity; and by marking the force of these forms, as they are there applied, we may be enabled to apply them of ourselves elsewhere. Whoever, therefore, will study mathematics with this view, will become not only by mathematics a more expert logician, and by logic a more rational mathematician, but a wiser philosopher, and an acuter reasoner, in all the possible subjects either of science or deliberation. But when mathematics, instead of being applied to this excellent purpose, are used not to exemplify logic, but to supply its place; no wonder if logic fall into contempt, and if mathematics, instead of furthering science, become in fact an obstacle. For when men, knowing nothing of that reasoning which is universal, come to attach themselves for years to a single species, a species wholly involved in lines and numbers, the mind becomes incapacitated for reasoning at large, and especially in the search of moral truth. The object of mathematics is demonstration; and whatever in that science is not demonstration is nothing, or at least below the sublime inquirer's regard. Probability, through its almost infinite degrees, from simple ignorance up to absolute certainty, is the *terra incognita* of the mathematician. And yet here it is that the great business of the human mind is carried on in the search and discovery of all the important truths which concern us as reasonable beings. And here too it is that all its vigour is exerted: for to proportion the assent to the probability accompanying every varying degree of moral evidence required the most enlarged and cautious exercise of reason.

Whatever then may be the objections to an excessive waste of time in syllogistic wrangling, and in learning the quirks and quibbles of the schools; still it must be admitted that logic, properly understood and judiciously employed, is an admirable instrument in the hands of either an enquirer after truth or a teacher of it. For from the proper use of logic we gain some very considerable advantages: as, 1. The consideration of rules incites the mind to a closer attention and application in thinking; so that we hereby become assured that we make the best use of our faculties. 2. We hereby more easily and accurately discover and point out the errors and defects in our reasoning; for the common light of reason, unassisted by logic, frequently observes an argumentation to be faulty, without being able to determine wherein the precise failure consists. 3. By these reflections on the order and manner of the operations of the mind, we are brought to a more just and complete knowledge of the nature of our own understanding. See METAPHYSICS.

LO'GICAL. *a.* (from *logic.*) 1. Pertaining to logic (*Hooker*). 2. Skilled in logic (*Add.*).

LO'GICALLY. *ad.* (from *logical.*) According to the laws of logic (*Prior*).

LOGI'CIAN. *s.* (*logicien*, Fr. *logicus*, Lat.) A teacher or professor of logic; a man versed in logic (*Swift*).

LOGISTICS, or LOGISTICAL ARITHMETIC, a name sometimes employed for the arithmetic of sexagesimal fractions, used in astronomical computations.

This name was perhaps taken from a Greek treatise of Barlæmus, a monk, who wrote a book of sexagesimal multiplication, which he called logistic.

LOGISTIC CURVE and SPIRAL. See LOGARITHMIC.

LO'GMAN. *s.* One whose business it is to carry logs (*Shakspeare*).

LOGOGRAPHY, a method of printing, in which the types, instead of answering only to single letters, are made to correspond to whole word

LOGOGRIPHUS, from the Greek λογος, discourse, and γριφος, or γριπος, net, a kind of symbol, or riddle, proposed to students for their solution, in order to exercise and improve the mind.

The logogriphus usually consists in some equivocal allusion, or mutilation of words; which, literally taken, signify something different from the thing intended by it; so that it is a kind of medium between a rebus and proper enigma.

According to Kircher, logogriphi are a kind of canting arms: thus a person called Leonard, who bore in his arms a lion and nard, or spikenard, according to that father, made a logogriphe. Œdip. Ægypt.

In another place the same author defines logogriphus to be an enigma; which under one name, or word, will bear various meanings, by adding or retrenching some part of it.—This kind of enigmas is well known to the Arabs, among whom are authors who treat expressly of it.

LO'GOMACHY. *s.* (λογομαχια.) A contention in words; a contention about words (*Howel*).

LOGWOOD. The logs and chips of the hæmatoxylum, campechianum or campechense, employed very largely as a dye. See HÆMATOXYLUM, and LIGNUM CAMPECHENSE.

LO'HOCKS. *s.* Medicines which are now called eclegmas, lambatives, or linctuses (*Quin*).

LOIN. *s.* (*llwyn*, Welsh.) 1. The back of an animal carved out by the butcher. 2. *Loins*; the reins. See LUMBI.

LOIR AND CHER, a department of France, including the late province of Blasois. It takes its name from the rivers Loir and Cher; the first of which falls into the Sarte, above Angers; and the last empties itself into the Loire, five miles above the confluence of the latter with the Indre. Blois is the capital.

LOIRE, the principal river of France, which rises in the mountains of the Cevennes, in Languedoc. It begins to be navigable at Roanne; and watering Nevers, Orleans, Blois, Tours, Saumur, and Nantes, falls into the bay of Biscay, below Paderborn.

LOIRE (Lower), a department of France, containing part of the late province of Bretagne. It has its name from the river Loire, which forms its south boundary, and then falls into the bay of Biscay. Nantes is the capital.

LOIRE (Upper), a department of France, late the province of Velay. It takes its name from the river Loire, which rises near its south boundary. Puy is the capital.

LOIRET, a department of France, late the province of Orleanois. It has its name from a small river that falls into the Loire. Orleans is the capital.

*To* LO'ITER. *v. n.* (*loteren*, Dutch.) To linger; to spend time carelessly; to idle (*Locke*).

LO'ITERER. *s.* (from *loiter.*) A lingerer; an idler; a lazy wretch (*Otway*).

LOKMAN the Wise, an eminent philosopher among the Easterns. The Arabians say he was the son of Baura, the son or grandson of a sister or aunt of Job. He was an Ethiopian, and a slave for some time. It is related that he was born in the time of David, and lived till the age of the prophet Jonas. Some suppose him to have been the same with Æsop the mythologist: and indeed we find in the parables or apologues of Lokman in Arabic, many particulars that are seen in Æsop's fables; so that it is not easy to determine whether the Greek or the Arabian are the originals. He is said to have been deformed in his person, but that this defect was sufficiently made up by the perfections of his mind. Some pieces of his are extant; and he was looked upon as so excellent a person, that Mahomet has inserted a chapter of the Koran, called after his name, in which he introduces God as saying, "We heretofore bestowed wisdom on Lokman."—It is related that he got his liberty on the following occasion: His master having given him a bitter melon to eat, he ate it all. His master, surprised at his exact obedience, asked, How it was possible for him to eat such a nauseous fruit? He answered, "I have received so many favours from you, that it is no wonder I should once in my life eat a bitter melon from your hand." This generous answer of the slave struck the master to such a degree, that he immediately gave him his liberty. M. Galland translated all the fables of Lokman, and Bidpai or Pilpay a Bramin philosopher, which were published at Paris in 1724.

LOLIUM. Darnel. In botany, a genus of the class triandria, order digynia. Calyx one-leafed, fixed, many-flowered; florets in a two-rowed spike. Five species: three common to our own fields; one a native of Jamaica; one of Malabar. The two following are chiefly worthy of notice.

1. L. perenne. Rye-grass. Red darnel. Spike awnless; spikelets compressed, lanceolate, longer than the calyx. There is another variety with awned flowers. In chalky land and pastures it grows freely. It makes excellent hay in soil of this description; and is of peculiar advantage, in consequence of its taking the lead in early hay harvests, and becoming ripe for the scythe before any other grass. The goat alone of all domesticated animals seems to have an aversion to it.

2. L. temulentum. White darnel. Spike awned; spikelets elliptic, as long as the calyx; culm rough above. The seeds are often malted with barley to produce intoxication in the ale or strong beer brewed from it.

*To* LOLL. *v. n.* 1. To lean idly; to rest lazily against any thing (*Dryden*). 2. To hang out. Used of the tongue.

*To* LOLL. *v. a.* To put out (*Dryden*).

LOLLARDS, in ecclesiastical history, a religious sect, differing in many religious points from the church of Rome, which arose in Germany about the beginning of the 14th century; so called, as many writers have imagined, from Walter Lollard, who began to dogmatise in 1315, and was burnt at Cologn; though others think that Lollard was no sur-

name, but merely a term of reproach applied to all heretics who concealed the poison of error under the appearance of piety.

The monk of Canterbury derives the origin of the word Lollard among us, from *lolium*, a tare; as if the Lollards were the tares sown in Christ's vineyard. Abelly says, that the word Lollard signifies praising God, from the German *loben*, to praise, and *herr*, Lord; because the Lollards employed themselves in travelling about from place to place, singing psalms and hymns.

Others, much to the same purpose, derive *lollhard, lullhard*, or *lollert, lullert*, as it was written by the ancient Germans, from the old German word *lullen, lollen*, or *lallen*, and the termination *hard*, with which many of the High Dutch words end. *Lollen* signifies to sing with a low voice, and therefore Lollard is a singer, or one who frequently sings; and in the vulgar tongue of the Germans it denotes a person who is continually praising God with a song, or singing hymns to his honour. The Alexians or Cellites were called Lollards, because they were public singers who made it their business to inter the bodies of those who died of the plague, and sang a dirge over them in a mournful and indistinct tone as they carried them to the grave. The name was not used to denote any one particular sect, but was formerly common to all persons and all sects who were supposed to be guilty of impiety towards God or the church, under an external profession of extraordinary piety. However, many societies, consisting both of men and women under the name of Lollards, were formed in most parts of Germany and Flanders, and were supported partly by their manual labours, and partly by the charitable donations of pious persons. The magistrates and inhabitants of the towns where these brethren and sisters resided gave them particular marks of favour and protection, on account of their great usefulness to the sick and needy. They were thus supported against their malignant rivals, and obtained many papal constitutions, by which their institute was confirmed, their persons exempted from the cognisance of the inquisitors, and subjected entirely to the jurisdiction of the bishops; but as these measures were insufficient to secure them from molestation, Charles duke of Burgundy, in the year 1472, obtained a solemn bull from Pope Sixtus IV. ordering that the Cellites or Lollards should be ranked among the religious orders, and delivered from the jurisdiction of the bishops; and Pope Julius II. granted them yet greater privileges in the year 1506. Mosheim informs us that many societies of this kind are still subsisting at Cologn, and in the cities of Flanders, though they have evidently departed from their ancient rules.

Lollard and his followers rejected the sacrifice of the mass, extreme unction, and penances for sin; arguing, that Christ's sufferings were sufficient. He is likewise said to have set aside baptism, as a thing of no effect; and repentance, as not absolutely necessary, &c.—In England the followers of Wickliffe were called by way of reproach Lollards, from some affinity there was between some of their tenets; though others are of opinion, that the English Lollards came from Germany: they were solemnly condemned by the archbishop of Canterbury and the council of Oxford.

LOLLIA (Paulina), a beautiful woman who married Caius Cæsar, and afterwards Caligula. She was divorced, and put to death by means of Agrippina.—*Tacit.*

LOLLIANUS (Spurius), a general, proclaimed emperor by his soldiers in Gaul, and soon after murdered, &c.

LOLLIUS (M.), a companion and tutor of C. Cæsar, the son-in-law of Tiberius. He was consul, and offended Augustus by his rapacity in the provinces. Horace had addressed two of his epistles to him, &c.—*Tacit.*

LOLME (John Lewis de), was born at Geneva, and bred to the profession of an advocate; but he resided many years in England, where he applied himself so closely to the study of the language as to be able to write it with considerable ease, accuracy, and elegance. In the year 1772 he published in English, A Parallel between the English Constitution and the former Government of Sweden; a pamphlet which was occasioned by the revolution which had recently taken place at Copenhagen. This is a tract of considerable merit. De Lolme only prefixed his initials to it; and it is written so as to lead the reader to conclude the writer to be an Englishman. In the year 1775 he published his Treatise on the Constitution of England, a work which has established his literary reputation upon a solid and durable foundation. The first edition was composed in French, and soon excited considerable attention. Its favourable reception led the author to put it in an English dress, and also to improve it where more mature reflection pointed out to him errors or deficiencies. In the English publication an addition of three new chapters was made to the second book. It were superfluous at this time to eulogize a work which has been received with universal approbation, and, for its kind, with almost unequalled popularity. Junius praised it as a performance deep, solid, and ingenious; and the greatest statesmen of modern times have not thought it beneath them to honour it with their warmest commendations. Its great merit consists in giving a clear and exact view of the British constitution, and in the judgment and ability with which its peculiar excellencies and general superiority are pointed out. The circumstance of the author being a foreigner gave him the advantage of considering his subject without those biasses of local prejudices and associations which are so commonly apt to influence the opinions and the feelings of all men when describing what they esteem the advantages of their native land. In 1787 he published an Essay, containing a few strictures on the union of Scotland with England. This tract was designed to form an introduction to De Foe's History of the Union. He was, besides, the author of several other works, the

chief of which was a History of the Flagellants, which he significantly enough called Memorials of Human Superstition. The others were political pamphlets, the interest and consequence of which passed away with the fleeting opinions and the measures of the times. As a writer De Lolme has displayed a mind of great vigour, cultivated with care, stored with a respectable share of learning, and with much original observation on the character and the relations of mankind. He writes with clearness and force, and with a purity of diction which, in a foreigner, may well excite the astonishment of the English reader. De Lolme died on the continent in the spring of 1807.

LOMBARD (Lambert), an eminent painter, born at Liege in 1500; who, after a diligent study of the antique at Rome, introduced that style of painting among his countrymen instead of the Gothic. He painted history, architecture, and perspective; and though he could never altogether free himself from his national goût, he is ranked among the best painters of his time. He died in 1560.

LOMBARD (Peter), well known by the title of Master of the Sentences, was born at Novara in Lombardy; but being bred at Paris, he distinguished himself so much at that university, that he first had the canonry of Chartres conferred on him, was some time tutor to Philip son of Louis le Gros, and lastly obtained the see of Paris. He died in 1064. His work of the Sentences is looked on as the source of the scholastic theology of the Latin church. He wrote also Commentaries on the Psalms, and on St. Paul's Epistles.

LOMBARD, or LOMBART (Peter), an engraver of considerable eminence, who flourished about the year 1660. He was a native of Paris, where he learned the art of engraving. It appears that he came into England before the Revolution, because some of his plates for English publications are dated prior to that event. He executed a vast variety of plates, as well historical as emblematical; which, however, were chiefly for books. But his best works are portraits; and of these he produced a considerable number, which are esteemed. They are mostly after Vandyck.—He also engraved historical subjects from Poussin, Raphael, Annibal Caracci, Guido, and other masters.

LOMBARDS, a Scandinavian nation, which formerly settled in Italy, and for some time made a considerable figure. Their name of Lombards, or Longobards, is by some derived from the word *lack*, or *lache*, signifying in the German tongue winter; because the Lombards, while in Scandinavia, lived in marshes, or near the sea. Others think that it comes from the two German words *langen barden* or *helleborden*, that is, from the long halberts they were supposed to use in war. But Paulus Diaconus their historian, and who was himself a Lombard, tells us, that they were called Longobards from the length of their beards. A nation called the Lombards is mentioned by Tacitus, Strabo, and Ptolemy; but these are different from the Lombards who afterwards settled in Italy, and are reckoned to be the same with the Gepidæ, whom the Italian Lombards almost exterminated. The Lombards who settled in Italy are first mentioned by Prosper Aquitanus, bishop of Rhegium in the year 379. That writer tells us, that about this time the Lombards, abandoning the most distant coasts of the ocean, and their native country Scandinavia, and seeking for new settlements, as they were overstocked with people at home, first attacked and overcame about this time the Vandals in Germany. They were then headed by two chiefs, Iboreus and Aion; who, dying about the year 389, were succeeded by Agilmund, who is commonly reckoned the first king of the Lombards.

The Lombards were at first a cruel and barbarous nation; but divesting themselves by degrees of their native fierceness and barbarity, especially after they had embraced the Christian religion, they governed with such equity and moderation, that most other nations envied the happiness of those who lived under them. Under the government of the Lombards (says Paulus Diaconus), no violence was committed, no one unjustly dispossessed of his property, none oppressed with taxes; theft, robberies, murder, and adultery, were seldom heard of: every one went, without the least apprehension, wherever he pleased. Their laws were so just and equitable, that they were retained in Italy, and observed there some ages after their kingdom was at an end.—According to Paulus Diaconus, also, their dress was loose, and for the most part of linen, such as the Anglo-Saxons wore, being interwoven with various colours; that their shoes were open to the end of their foot, and that they used to button or lace them. From some ancient paintings it appears that they shaved the back part of their heads, but that their hair was long before; their locks being parted, and laid on each side their foreheads.

The history of the Lombards is interesting: but we have not room to trace it here.

LOMBARDY, a part of Italy, which comprehends almost all the ancient Cisalpine Gaul. It lies towards the north, and is divided into the Upper and Lower. Upper Lombardy, the western part, comprehends Piedmont, with its dependencies, and the duchies of Montserrat and Milan. Lower Lombardy, the eastern part, contains Parma, Modena, Mantua, Ferrara, the Bolognese, the territories of the church, the Paduan, Vicentino, Veronese, Bresciano, Cremasco, and Bergamo. In the late war, the whole of these provinces were overrun by the French republicans, who not only levied exorbitant contributions on the inhabitants, but also demanded many of their finest pictures and statues, which they transported to Paris.

LOMBARDY POPLAR. See POPULUS.

LOMBEZ, a town of France, in the department of Gers, lately a bishop's see. It is seated on the Save, 27 miles S.W. of Toulouse. Lon. 1. 0 E. Lat. 43. 29 N.

LOMENT. In botany, an elongated peri-

carp, consisting of two valves: externally it forms sutures, but, like the legume, it never bursts. Internally it is divided into cells by small transverse partitions, which contain only one seed, attached to the under-suture; as in the case of cassia fistula.

LOMENTACEÆ. (*lomentum*, a sort of colour in Pliny, *a lotu*, being made by washing. But it also signifies *farina fricta*, parched meal, or, according to others, *farina fabacea*, bean meal.) The name of the fifty-sixth order in Linnéus's Fragments; and of the thirty-third in his Ordines Naturales.

LOMOND (Ben), a great mountain, in the north of Stirlingshire, about 3200 feet above the level of the lake at its bottom. It stretches along the east side of Loch Lomond several miles: and its broad base extends so far into the country, that the ascent of this mountain, though steep, is computed to be six miles. Ptarmigans, and other heath fowls, frequent its upper regions: its lower are the haunts of the roebuck; and herds of cattle feed in the irriguous valleys at its base. From this lofty mountain are seen Loch Lomond, the Clyde, the Forth, Edinburgh, the eastern coast as far as the Cheviot Fells, the isles of Bute and Arran, the rock of Ailsa, Ireland, the mountain of Plynlimmon in Wales, the Skiddaw in Cumberland, and the hills far beyond it.

LOMOND (Loch), a beautiful lake in Dumbartonshire, 28 miles long, and its breadth from three quarters of a mile, increasing to seven miles. It contains 33 islands; several of which are inhabited and adorned with antique ruins, concealed among ancient yews; and others rise into high rocky cliffs, the habitation of the osprey, or sea eagle. The duke of Montrose has a seat on the south-east corner of it, where terminate the Grampian mountains; and on the west side, where it is broadest, is a seat of the family of Luss, screened by mountains and ancient woods. In 1755, when Lisbon was destroyed by an earthquake, this lake was extremely agitated.

LOMENIE (Henry Louis, count de Brienne), a French nobleman, who was secretary of state under Louis XIV. but the loss of his wife drove him melancholy, and he was obliged to be confined. However in this state he had reason enough to write the Memoirs of his own Life; an Account of his Travels; Poems, and other works of merit. He died in 1698.

LOMONOZOF, a Russian poet of considerable merit, was the son of a fishmonger, and having fled from his father took refuge in a monastery, where he received a good education, which he afterwards improved at a German university. In 1741 he returned to his native country, and in 1743 became member of the academy of St. Petersburg, and professor of chemistry. In 1761 he was honoured with the title of counsellor of state, but died the same year, aged 54. He is justly called the father of the Russian poetry, and his works make three vols. 8vo. consisting of pieces in verse and prose, those of the last description being mostly philosophical dissertations, which shew him to have been as respectable in science as in poetry.

LOMP-FISH, in ichthyology. See CYCLOPTERUS.

LON, or LUNE, a river which rises in Westmoreland, and flowing by Kirby Lonsdale in that county, falls into the Irish Sea, below Lancaster. Its banks are beautiful and romantic.

LONATO, a town of Italy, in the Bresciano, twelve miles E.S.E. of Brescia. Lon. 10. 11 E. Lat. 45. 24 N.

LONCHITIS. Spleenwort. In botany, a genus of the class cryptogamia, order filices. Fructification in small, crescent-shaped lines in pairs, at each sinus of the frond; involucres from the inflected margin of the frond, opening towards the rib. Four species: the leaves are used as balsamic: the root as an aperient and diuretic. All the species are exotics.

LONCHIVRUS. In zoology, a genus of the class pisces, order thoracica. Pectoral fins separate; tail lanceolate. One species only; brown, with two cirri under the chin. Inhabits the rivers of Surinam; about ten inches long; body of a deeper or lighter brown.

LONDE (Francis de la), a French poet, was born at Caen in 1685. Besides his poems, which are much esteemed, he wrote some pieces which shew him to have been a man of general knowledge. He died in 1765.

LONDON, a city of England, in the county of Middlesex, the metropolis of Great Britain. Camden supposes that this city derived the name of London from the British words *Llhwn*, a wood, and *Dinas*, a town; by which etymology of the word London signifies a town in a wood, which agrees with the manner in which the Britons formed their towns, by building them in the midst of woods, and fencing them with trees cut down: but lest this derivation should not please, the same learned writer gives another, from the British word *Lhong*, a ship, and *Dinas*, a city, and then the word London will signify a city or harbour for ships; and, indeed, it has been supposed by many learned authors, that, before Cæsar's time, London was the ancient emporium or mart of the British trade with the Phœnicians, Greeks, and Gauls: and indeed Tacitus represents it as a considerable, opulent, and commercial town in the time of Nero. The modern Welsh, who are likely to preserve the same appellation by which London was formerly known, call it *Caer Lundain*; which name strictly applies to the situation of the town. *Caer* means a rampart, a fortress or city, and *Lundain* is a compound of *Lun* and *tain* (becoming dain in composition.) Lun implies an expanse of water, and Tain is the British name for Thames. This river formerly spread its waters over a considerable tract of land from Battersea in Surry, to Erith in Kent: and from Kentish-town over most of the intermediate space to St. George's Fields, &c. Caer Lundain, therefore, means literally 'the town on the broad water of the Tain or Thames.' The Britons would not have used Caer with Lun-

dain if the last syllable had been *din*, a town, as it would be a palpable pleonasm; neither would the Saxons have called it Lunden-ceaster, Lundenburg, and Lundenwic, if the same termination had been identified with den, ton, or toun, for the same reason.

London had few if any buildings, either of brick or stone, till it was inhabited by the Romans; yet in the year 26 it was very famous for the multitude of its merchants, and the greatness of its traffic; and soon after, Suetonius, because it was too large to be defended by his little army of 10,000 Romans, abandoned the city to Boadicea, who set it on fire, and put all the inhabitants to the sword. London soon recovered from this dreadful catastrophe, and, in a few years, increased in the number of its inhabitants, its trade, and buildings, and was made a prefecture by the Romans, in imitation of Rome itself. The time when the city wall was first erected is very uncertain, some authors ascribing this work to Constantine the Great, others to his mother Helena; and others, again, to Valentinian, about the year 368. This wall was composed alternately of layers of flat Roman brick, and rag stones, and had many lofty towers. Those on the land side were fifteen in number. During the Saxon heptarchy, London was the metropolis of the kingdom of the East Saxons, governed by a magistrate called a portreve, that is, a governor or guardian of a port. In the year 400, Augustine the monk introduced Christianity into England, and was made archbishop of Canterbury, when he ordained Mellitus bishop of the East Saxons, establishing the see at London, where a church was erected for him by Ethelbert, king of Kent. London frequently suffered by fires, and was twice plundered by the Danes; the last time they transported an army, in 350 ships, up the Thames, and, landing near London, soon reduced and plundered it; when, looking upon it as a convienient fortress, whence they might at pleasure invade the kingdom of Wessex, made it a place of arms, and left in it a considerable garrison; but the wise and brave Alfred recovered the city, drove out the invaders, and then not only repaired the wall and towers, but embellished the city with additional buildings. The city having no bridge, the citizens crossed the Thames by means of ferries; but between the years 993 and 1016, a wooden bridge was erected in the reign of Ethelred; and in the last mentioned year Canute, king of Denmark, sailed up the river, in order to plunder the city; and finding that he could not pass the bridge with his ships, caused a canal to be cut through the marshes, on the south side of the river, by which means Canute brought his ships to the west of London bridge, and attacked the city on all sides. However, the citizens exerting themselves with extraordinary bravery, he was repulsed with considerable loss, and obliged to raise the siege. Yet he afterwards renewed it with greater vigour than before, but with no better success. At last a peace was concluded between king Edmund and Canute, by which the kingdom was divided between them, when Mercia, of which London was the capital, falling to Canute's share, the city submitted to him; and Edmund dying a few months after, Canute became sole monarch of England. The Londoners submitting to William the Conqueror, he, in the year 1067, granted them his first charter, in their own language. In 1077, by a casual fire, the greatest part of it was laid in ashes; and about two years after the conqueror caused the tower of London to be erected, to keep the citizens in awe. Besides the first charter, William afterwards granted them another; but London obtained one much more extensive from Henry I. by which the county of Middlesex was added to their jurisdiction, on paying the quit rent of 300l. a-year; with a power of appointing not only a sheriff, but a justiciary, from among themselves. Before the grant of this charter London seems to have been entirely subject to the arbitrary will of the king. But the liberties of the citizens being now guarded by so strong a fence, they endeavoured to secure their customs, by converting them into written laws; and the several bodies, professing the arts and mysteries of trade and manufacture, which had hitherto been kept up by prescription only, were now strengthened, by being formed into established companies. The king, however, reserved to himself the power of appointing the portreve, or chief officer of the city. Upon the death of Henry I. the citizens assisted king Stephen in his endeavours to obtain the crown, and in 1135 received him into the city. In the year 1139 the citizens purchased of king Stephen, for a hundred marks of silver, the right of choosing their own sheriffs. King Henry II. granted the citizens a charter, which confirmed their liberties and immunities. The second of September, 1189, the day preceding the coronation of Richard I. surnamed Cœur de Lion, was remarkable for a dreadful massacre of the Jews in this city. In the year 1197 the citizens purchased of king Richard a charter, for 15,000 marks, the conservancy of the River Thames, with a power of removing weirs and other obstructions. In the year 1207 Henry Fitz-Alwyn took the title of mayor instead of custos and bailiff, under which names he had held that dignity for twenty years successively. In the year 1211 the citizens began to encompass the wall with a deep ditch, 200 feet wide. About this time the forest of Middlesex being disforested, the citizens obtained an opportunity of purchasing land, and building houses upon it, by which the suburbs of the city were greatly increased, and soon enlarged to a considerable extent without the walls, though all the ground within them was far from being converted into regular streets. The city was divided into twenty-four wards, under the government of the aldermen; and each ward chose some of the inhabitants as common-council men, who were sworn into their office; these were to be consulted by the aldermen, and their advice

followed in all public affairs relating to the city. The above regulation was made in the reign of king Edward I. who also granted the citizens a charter, by which he confirmed all their ancient privileges. Some years before their receiving this favour, the lord treasurer summoned the mayor, aldermen and citizens, to attend him in the Tower, to give an account how the peace of the city had been kept; but Gregory Rockesley, the mayor, resolving not to attend in that quality, laid aside the ensigns of his office at Barking church, and repaired to the Tower as a private gentleman; which was so highly resented by the treasurer, that he committed him and several citizens to prison. This proceeding the king so far approved, that, though he discharged the mayor, he seized the city liberties, and having appointed a custos of the city, there was no mayor of London for twelve years after. In 1306 sea-coal beginning to be much used in the suburbs of London by brewers, dyers, and others requiring great fires, the nobility and gentry complained to king Edward II. that the air was infected by the noisome smell, and the thick clouds of smoke it occasioned, to the endangering of the health of the inhabitants; upon which a proclamation was issued, forbidding it to be used; but little regard being paid to it, the king appointed a commission of oyer and terminer, to enquire after those who had acted in open defiance of this injunction. In the year 1327 king Edward III. granted the citizens two charters; by the first of which it was ordained, that the mayor shall be constantly one of the judges of oyer and terminer, for the trial of criminals confined in Newgate, &c. By the second charter, Southwark is granted for the good and benefit of the citizens. The same prince, in the year 1354, granted the city the privilege of having gold or silver maces carried before the chief magistrate, a privilege then peculiar to London. This is the time when it is supposed by some that the title of lord was first added to that of mayor. In the year 1348 the city was visited by a most terrible pestilence, which continued to rage till the church-yards were found not capacious enough to receive the bodies. This induced several persons to purchase ground to supply that defect; and in one of these burying grounds, bought by sir Walter Manny, were interred, the next year, 50,000 persons: by this dreadful pestilence 100,000 persons are said to have died in this city. In the fifth year of the reign of king Richard II. the city suffered greatly by the rebellion of Wat Hilliard, commonly called Wat Tyler. William Walworth, the lord mayor, being ordered to arrest him, that magistrate gave him such a blow on the head with his sword, that he fell wounded from his horse, and was soon dispatched. Several writers ascribe to the action of this day the addition of a dagger to the arms of the city, in remembrance of the good service done by them, and particularly by the lord mayor. In the year 1392 the city refusing to lend the king a sum of money, and some of the citizens beating and abusing a Lombard merchant, for offering to advance the sum required, the mayor was committed prisoner to Windsor castle, and several of the aldermen and citizens to other prisons; and by a commission of enquiry, under the great seal, being found guilty, they were fined 3000 marks, and the liberties of the city seized; the mayor was degraded from his office, and a custos appointed in his room; the sheriffs were also degraded, and others chosen; and, by the king's precept, seventeen persons were appointed aldermen during the royal pleasure. As a farther mortification to the city, the king not only withdrew, with the nobility, to York, but removed the courts of justice to that city. However, upon payment of the fine of 3000 marks, all the city liberties were restored, except the privilege of choosing a mayor. In the year 1407 a dreadful plague carried off 30,000 of the inhabitants, whereby corn became so cheap that wheat sold at 3s. 4d. the quarter. In the reign of Henry V. sir Henry Barton, the lord mayor, first ordered lanterns to be hung out for illuminating the streets by night. In the second year of the reign of Edward IV. a dreadful pestilence raged in London, which swept away an incredible number of people. In the beginning of the reign of Henry VII. the sweating sickness first raged in London; of which disease two lord mayors, and one of the sheriffs, died within the year. In the year 1500 the plague carried off 20,000 persons; and, during this reign, the city also suffered greatly by the oppressions of the king's ministers Empson and Dudley. The citizens being extremely exasperated at the encouragement given to foreigners, a priest, named Bell, was persuaded to preach against them at the Spital, and in a very inflaming sermon he incited the people to oppose all strangers; this occasioned frequent quarrels in the streets, for which some Englishmen were committed to prison. A rumour arose, that, on May-day, all the foreigners would be assassinated, and several strangers fled; this coming to the knowledge of the king's council, cardinal Wolsey sent for the lord mayor and several of the city council, told them what he had heard, and exhorted them to preserve peace. One of the aldermen, returning from his ward, observed two young men at play in Cheapside, and many others looking at them. He would have sent them to the compter, but they were soon rescued, and the cry raised of 'Prentices, 'Prentices! Clubs, Clubs! Instantly the people arose; by eleven o'clock they amounted to six or seven hundred; and the crowd still increasing, they rescued from Newgate and the Compter the prisoners committed for abusing the foreigners; while the mayor and sheriffs, who were present, made proclamation in the king's name; but, instead of obeying it, they broke open the houses of many Frenchmen and other foreigners, and continued plundering them till three in the morning, when beginning to disperse, the mayor and his attendants took 300 of them, and committed them to the several prisons. On the 4th of May the lord

mayor, the duke of Norfolk, the earl of Surry, and others, sat upon the trial of the offenders at Guildhall, the duke of Norfolk entering the city with 1300 men. That day several were indicted, and on the next thirteen were sentenced to be hanged, drawn, and quartered; for the execution of whom ten gallowses were set up in several parts of the city, upon wheels, to be removed from street to street, and from door to door. On the 7th of May several others were found guilty, and received the same sentence as the former, and, soon after, were drawn upon hurdles to the standard in Cheapside; but when one was executed, and the rest about to be turned off, a respite came, and they were remanded back to prison. In the year 1551 king Edward VI. gave the city a charter, by which he not only confirmed all its former privileges, but granted the lord mayor, aldermen, and citizens, several lands and tenements in Southwark, with the manor thereof, and its appurtenances; the assize of bread, wine, beer, and ale; a fair for three days; and the offices of coroner, escheator, and clerk of the market, which are for ever vested in the lord mayor and his successors. In the reign of queen Elizabeth the far greater part of this metropolis was contained within the walls; and even in these narrow limits were many gardens, which have since been converted into lanes, courts, and alleys. The buildings of London were, on the west, bounded by the monastery of St. Catherine; East Smithfield was open to Tower-hill. The Minories were built only on the east side, which fronted the city wall; cattle grazed in Goodman's Fields, and Whitechapel extended but a little beyond the bars, and had no houses to the north; for Spitalfields, which of themselves would now compose a very large town, were then really fields, separated from each other by hedges and rows of trees. Hounsditch consisted only of a row of houses fronting the city wall, and the little yards and gardens behind them also opened into those fields. Bishopsgate-street, Norton Falgate, and the street called Shore-ditch, were then, however, built as far as the church; but there were only a few houses and gardens on each side, and no streets or lanes on either hand. Moorfields lay entirely open to the village of Hoxton; and Finsbury Fields, in which were several windmills, extended to the east side of Whitecross street. Chiswell-street was not erected; and St. John's-street extended by the side of the priory of St. John of Jerusalem, to the monastery of Clerkenwell and Cowcross, which opened into the fields. But on leaving the city walls, the buildings were much less extensive; for though the village of Holborn was now joined to London, the backs of the houses, particularly on the north side, opened into gardens and fields; part of Gray's Inn-lane were the only houses that extended beyond the main streets, great part of High Holborn had no existence, and St. Giles's was a village, contiguous to no part of London. If we turn to the Strand, we also find that spacious street had gardens on each side, and to the north, fields behind those gardens, except a few houses, where is now the west end of Drury-lane. On the south side of the street the gardens generally extended to the Thames; though some of the nobility had houses on the back of their gardens, next the water-side. Covent-garden, so called from its belonging to the convent at Westminster, extended to St. Martin's-lane, and the field behind it reached to St. Giles's. That lane had few edifices besides the church, for Covent-garden wall was on one side, and a wall which inclosed the Mews on the other, and all the upper part was a lane between two hedges, which extended a little to the west of the village of St. Giles's. Hedge-lane, now Whitcomb-street, was between two hedges; the extensive street, now called the Hay-market, had a hedge on one side, and a few bushes on the other. Neither Pall-Mall, St. James's-street, Piccadilly, nor any of the streets or fine squares in that part of the town, were built; and Westminster was a small town on the south-west and south sides of St. James's Park. Lambeth was, at that time, a little village, at a considerable distance from Southwark, and there were no buildings on the south bank of the Thames, till a row of houses began opposite to White Friars, and extended along the river, with gardens, fields, or groves behind them, till almost opposite the Steel-yard, where several streets began: the Borough extended a considerable distance from the bridge to the south, and the building to the east as far as the Tower. This was the state of this great metropolis so lately as in the reign of queen Elizabeth; and how inconsiderable soever it must appear, when compared with its present dimensions, yet by order of that queen a proclamation was published, by which all persons were forbidden to build upon new foundations. In the year 1603, 30,578 persons died of the plague. In the year 1613 the water of the New River, brought from Ware by Sir Hugh Middleton, was let into the lower reservoir at Islington, with great ceremony; the next year Smithfield was first paved, and, in 1615, the sides of the streets of this city being paved with pebble-stones, which had hitherto rendered walking very troublesome, the inhabitants of the principal streets first began to pave their doors with broad free-stone and flags. In the year 1625, when king Charles I. ascended the throne, a most dreadful pestilence raged in London: the fatal effects of this distemper had been frequently felt; but it now carried off, within the space of a year, in the city and suburbs, 35,417 persons, besides those who died of other distempers, which, in the whole, amounted to 54,265, said to be one-third of the inhabitants. During this unhappy reign great disputes arose between the king and the city, in relation to ship-money, loans, &c. But even in the midst of these disputes, and while the king was actually opposing the liberties of the citizens, he granted them several charters, by which he confirmed all their former privileges, and added some new ones. At length the lord mayor,

contrary to an order of parliament, endeavouring by proclamation to raise troops for his majesty, he was committed to the Tower, and several articles of impeachment being brought against him, he was, by the sentence of the house of peers, degraded from the mayoralty, and rendered incapable of bearing any office, or receiving any farther honour. There being, some time after, but little prospect of an agreement between the king and parliament, and the greatest part of the city being averse from all thoughts of an accommodation, the common-council passed an act for fortifying the city. This act of common-council being soon after confirmed by an order of parliament, upwards of twenty forts were raised, all joined by a line of communication, formed by a rampart of earth, which on all sides surrounded the cities of London and Westminster, and the borough of Southwark. This was done at the expence of the city, and the whole was immediately executed with the greatest alacrity. After this the city entered heartily into the measures of the parliament, though the lord mayor, aldermen, and common-council frequently solicited that body to settle the peace of the kingdom: but soon after the king's death, an order being sent to the lord mayor and sheriffs, to proclaim the abolition of monarchy, he refused to comply, upon which he was brought to the bar of the house of commons, committed prisoner to the Tower for two months, and another mayor chosen in his room. At the inauguration of Cromwell, in 1657, as lord protector, the lord mayor carried the city sword before him, accompanied by the earl of Warwick, who carried the sword, and, during the ceremony, stood on the right side of Cromwell's chair, while the lord mayor stood on the left. But after the death of Cromwell, the common-council opposing the committee of safety, declaring for a free parliament, and refusing to pay or advance money to the parliament, general Monk was ordered to march with his army into the city, and the streets became planted with soldiers, when several of the aldermen and common-council were taken into custody, the whole body disqualified, and a new common-council ordered to be chosen; after which the city gates were broken and cut to pieces, the portcullises taken down and destroyed, and the posts and chains taken down. After this the city heartily and zealously joined with general Monk in bringing about the restoration. About the beginning of May, 1665, a most dreadful plague broke out in this city: the week wherein this distemper was first discovered it carried off nine persons; the week after three; the next week the number increasing to fourteen, and progressively to forty-three, the people were struck with consternation, and many of them had thoughts of leaving the city: but in the month of June, the number having gradually increased to 470 a week, the nobility, gentry, and principal citizens fled into the country for safety. In July, the bill increasing to 2010, all houses were shut up, the streets deserted, and scarce any thing to be seen therein but grass growing, innumerable fires made to purify the air, coffins, pest-carts, red crosses upon doors, with the inscription of "Lord have mercy upon us!" and poor women in tears, with woeful lamentations, carrying their infants to the grave! and scarce any other sounds to be heard than those incessantly repeated from the windows, "Pray for us!" and the dismal call of "Bring out your dead!" In the month of September the burials amounted in one week to 6988; but the week after the bill falling to 6544, gave some glimmering hopes that this dreadful distemper was past its crisis: however, the mortality increased the week following to 7165. After this the contagion gradually decreased, till it pleased the Almighty to restore this desolate city to its pristine state of health, after the direful ravages of this distemper had swept off 68,596 persons, which, together with those who died of other diseases, made the bill of mortality for this year amount to 97,306. The above calamity was scarcely ceased, and those who had fled returned to their houses, when, on Sunday, the 2d of September, 1666, a dreadful fire broke out at one in the morning in the house of Mr. Farryner, a baker, in Pudding-lane. The house containing much brush and faggot wood, the fire soon got ahead, and furiously seized on the neighbouring houses on all sides, running four ways at once; it continued burning and destroying every thing in its way the whole of Monday, Tuesday, and Wednesday. On Thursday the flames were extinguished; but that evening the fire burst out again at the Temple, by the falling of some sparks upon a pile of wooden buildings; but upon blowing up the houses around it with gunpowder, it was extinguished the next morning. By this dreadful conflagration were consumed 400 streets and lanes, 13,200 houses, the cathedral of St. Paul, eighty-six parish churches, six chapels, the Royal Exchange, Blackwell-hall, and the Custom-house, several hospitals and libraries, fifty-two of the companies' halls, and a vast number of other stately edifices, together with three of the city gates, four stone bridges, and four prisons; the loss of which, with that of the merchandise and household furniture, amounted, according to the best calculation, to 10,730,500l.: but it is amazing that in this terrible devastation only six persons lost their lives by the fire. London, indeed, might now have been rebuilt in such a manner as to have exceeded in beauty all the cities upon earth; two plans were formed by Sir Christopher Wren and sir John Evelyn, but both rejected. However, it was ordered, by act of parliament, that many of the streets and lanes should be widened, that all the houses should be built with stone or brick, with party walls, and the whole finished within three years: that the ground in several places should be raised, and that a column of brass or stone should be erected on or near the place where the above dreadful fire began; whence arose that column called the Monument; but had it been raised near the

place where the fire ceased, and in the centre of the fine circular area proposed by Sir Christopher Wren, in Fleet-street, where eight streets would radiate upon it, and where it would be seen to terminate the view even from Aldgate and Westminster, it would have enjoyed a situation vastly more worthy of its beauty, and have appeared to infinitely greater advantage, than in the corner where it is now placed. In the year 1687 a dreadful persecution raging in France against the distressed Protestants, 13,500 of them came over and settled in this city, and the parts contiguous, particularly in Spitalfields, by which they greatly enriched the city and kingdom, by introducing among us new arts and manufactures. In 1716, by a long dry season, the river Thames was reduced so low, that by a violent storm of wind at west-south-west it was blown so dry, during the recess of the tide, that many thousand people passed it on foot, both above and below bridge, and walked through most of the arches. The year 1733 was rendered memorable by the effectual opposition made by the citizens against a scheme for a general excise. The last and present reign are rendered remarkable by the multitude of magnificent buildings, fine streets, and spacious squares, that have been added, and still are adding to this metropolis. The incorporated societies of merchants are the Hamburgh company, incorporated by Elizabeth, but subsisting under the name of merchants of the staple and merchants adventurers, as early as Edward I; the Russia company; the Levant or Turkey company; the East India company; the Royal African company; the Hudson's Bay company: the South Sea company: besides these, the Royal Exchange and the London Insurance companies were incorporated by George I. for the security of property, for which there are several other offices established, but not incorporated. Among the public civil buildings of this metropolis is the Bank of England, established, by act of parliament, in 1693, and greatly enlarged by additional buildings within the last twenty years. Upon the accession of queen Elizabeth, in 1558, the commercial as well as political affairs of this country began to make a much more conspicuous figure among the nations of Europe. Her first care was the protection of the two societies of merchants adventurers and merchants of the staple, long before settled in Germany; and by several wise and judicious regulations and restrictions, to set her foreign and domestic trade above the controul of other powers, who, on this occasion, betrayed evident marks of jealousy and discontent. The queen, however, far from being intimidated, wisely provided for her own security against future disasters, by filling her magazines with ammunition and military and naval stores. In the second year of her reign she caused gunpowder to be made in England, which, till this time, had been supplied by the German steel-yard company; she built a considerable number of ships of war, forming the most important fleet that England had ever seen; insomuch, that foreigners styled her "the restorer of naval glory, and queen of the northern seas." Her wealthiest merchants also, after her example, began to build ships with great alacrity; and, on any emergency, readily joined them with the national fleet, which enabled her to send out 20,000 fighting men for sea-service. A charter of incorporation had been granted by Philip and Mary, in 1554, to the Russia company, who had, in consequence, opened a factory in Moscow, and completed two or three voyages. To give stability to this undertaking, the queen, in 1569, sent over sir Thomas Randolph with dispatches to the czar in behalf of this new company, and obtained for them an exemption from all duties, customs, &c. with leave to transport their merchandize into Persia, and to trade in the fullest and most ample manner. This propitious reign also gave birth to the East India company. The queen, by being at war with Spain, was prevented from getting spices from Lisbon at first hand; she, therefore, determined to enter her people directly upon a commerce to the East Indies. Accordingly, on the 31st of December, 1600, she granted a charter to George earl of Cumberland, and 215 knights, aldermen, and merchants, that, at their own costs and charges, they might open a trade to the East Indies, in the country and parts of Asia and Africa, to be one body politic and corporate, by the name of The Governor and Company of Merchants of London, trading to the East Indies. The utmost encouragement was also given, either separately or collectively, to all English merchants who chose to make adventures abroad, for the improvement of our commerce, and the extension of our trade. The Levant or Turkey company were incorporated under a perpetual charter, by the designation of the merchants of England, trading to the Levant seas. The London and Liverpool merchants, also, sent out several ships to Greenland. In the year 1613 the money paid for exports and imports in London alone amounted to 109,572l. 18s. 4d. which was very near thrice as much as all the other ports of England paid for customs in the same year. The silk manufactures of London were also, by this time, become so considerable, that, in 1629, they were incorporated by Charles I. under the name of The Master, Warden, Assistants, and Commonalty of Silk Throwers, of the city of London, and within four miles of it. From the year 1645 we may date the commencement of private banking, which originated with the goldsmith's company. In a very short time banking constituted a very considerable branch of business. The goldsmiths began to discount merchant's bonds and bills, both in town and from the country; and also began to receive the rents of gentlemen's estates remitted to town, and to allow them, and others, who put cash into their hands, some interest for it, if it remained only for a single month. The year 1660 gave birth to the Royal Society of London, incorporated by Charles II. The merchants of

London trade to all parts of the world, exporting to Turkey woollen clothes, tin, lead, and iron, solely in our own shipping; and bringing from thence raw silk, carpets, galls, and other dying ingredients, cotton, fruits, medicinal drugs, coffee, &c. To Italy, woollen goods of various kinds, peltry, leather, lead, tin, fish, and East India merchandize; and bring back raw and thrown silk, wines, oil, soap, olives, oranges, lemons, pomegranates, dried fruit, colours, anchovies, &c. To Spain, all kinds of woollen goods, leather, lead, tin, fish, corn, iron and brass manufactures, haberdashery-wares, assortments of linen from Germany, and elsewhere; and receive in return wines, oils, dried fruits, oranges, lemons, olives, wool, indigo, cochineal, and other dying drugs, colours, gold and silver coins, &c. To Portugal the same kind of merchandise as to Spain, and make returns in vast quantities of wines, oils, salt, dried and moist fruits, dyers ingredients, and gold coins. To France, tobacco, lead, tin, flannels, horns, hardware, Manchester goods, &c. and sometimes great quantities of corn; and make our returns in wines, brandies, linens, cambrics, lace, velvets, brocades, &c. To Flanders, serges, flannels, tin, lead, sugars, and tobacco; and make returns in fine lace, linen, cambrics, &c. To Germany, cloth and stuffs, tin, pewter, sugars, tobacco, and East India merchandise; and bring from thence linen, thread, goat-skins, tinned plates, timbers for all uses, wines, and other articles. To Norway, tobacco and woollen stuffs; and bring from thence vast quantities of deal and other timber. To Sweden most of our home manufactures; and return with iron, timber, tar, copper, &c. To Russia, great quantities of woollen cloths and stuffs, tin, lead, tobacco, diamonds, household furniture, &c. and make returns in hemp, flax, linen, thread, furs, pot-ash, iron, wax, tallow, &c. To Holland, immense quantities of different sorts of merchandise, such as all kinds of woollen goods, hides, corn, coals, East India and Turkey articles imported by those respective companies, tobacco, tar, sugar, rice, ginger, and other American productions; and return with fine linen, lace, cambrics, thread, tapes, incle, madder, boards, drugs, whalebone, train-oil, toys, and various other articles of that country. To America we send our home manufactures of almost every kind; and make our returns in tobacco, sugars, rice, ginger, indigo, drugs, log-wood, timber, &c. To the coast of Guinea they send various sorts of coarse woollen and linen goods, iron, pewter, brass, and hardware manufactures, lead-shot, swords, knives, fire-arms, gunpowder, glass manufactures, &c.; and bring home vast numbers of negro slaves, gold dust, dying and medicinal drugs, red-wood, Guinea grains, ivory, &c. To Arabia, Persia, East Indies, and China, they send much foreign silver coin and bullion, manufactures of lead, iron, and brass, woollen goods, &c.; and bring home muslins and cottons of various kinds, calicoes, raw and wrought silk, chintzes, teas, porcelain, coffee, saltpetre, gold dust, and many drugs for dyers and medicinal uses. These are exclusive of our trade to Ireland, Newfoundland, West Indies, and many of our settlements and factories in different parts of the world. The trade to the East Indies certainly constitutes one of the most stupendous political, as well as commercial machines, that is to be met with in history. The trade itself is exclusive, and lodged in a company, which has a temporary monopoly of it, in consideration of money advanced to the government. Without entering into the history of the East India trade within these twenty years past, and the company's concerns in that country, it is sufficient to say, that besides their settlements on the coast of India, which they enjoy under certain restrictions, by act of parliament, they have through the various internal revolutions which have happened at Hindustan, and the ambition or avarice of their servants and officers, acquired such territorial possessions, as render them the greatest commercial body in the world.—The city of London is divided into twenty-six wards, each of which is under the jurisdiction of an alderman, chosen by the free inhabitants at large, in assemblies termed wardmotes; out of these aldermen, one is annually elected, on Michaelmas-day, to be the lord mayor, or the supreme magistrate over the whole city, and who enters on his office the 9th of November following. The lord mayor and citizens of London have the sheriffalty of London and Middlesex in fee, by charter; and the two sheriffs are by them annually elected. The recorder, who is a counsellor experienced in the law, is chosen by the lord mayor and aldermen, for their instruction and assistance, in matters of justice and proceedings according to law. He speaks in the name of the city upon all extraordinary occasions: reads and presents their addresses to the king; and when seated upon the bench delivers the sentence of the court. The chamberlain of London is annually chosen by the livery on Midsummer-day, though he is never displaced from his office, unless some material complaint is alleged against him. Besides these officers of trust, there are several others, viz. the coroner, the town clerk, the common serjeant, the city remembrancer, &c. The number of churches in the city and suburbs, in the year 1593, was 113, besides those in Westminster, and the new ones built by the act of queen Anne. Before the fire there were ninety-seven within the walls, and seventeen without. There are now but sixty-two parish churches within the city and liberties. The steeples of St. Mary le Bow, St. Bride's, the cathedral of St. Paul's, and the church of St. Stephen, Walbrook, were built by sir Christopher Wren. The Guildhall was built in the year 1411. Other public buildings are, the Bank, established by act of parliament in 1693, and wonderfully beautified and enlarged within the last thirty years; the Royal Exchange, first built by sir Thomas Gresham, in the year 1566, and rebuilt after the fire of London. British Mu-

seum, Herald's-office, Sion-college, Somerset-house, where now most of the public offices are held; College of Physicians; there are also theatres, opera houses, &c. Besides these, the public buildings belonging to charitable and literary institutions are very numerous and very splendid. But as it is impossible to give an adequate description of these in the compass of a few pages, we must refer the reader to Kearsley's Stranger's Guide through London and Westminster, or to the Picture of London published by sir Richard Phillips, for the most correct and satisfactory information.

London sends four members to the British House of Commons. The number of inhabitants has been variously estimated at 700,000, at 800,000, and even as high as 1,000,000. Dr. Brakenridge almost 30 years ago estimated the inhabitants at 751,800; Mr. Wales, at 625,123; Mr. Price at about 660,000. By the survey in 1801, the number of inhabited houses within the bills of mortality was found to amount to 106,572, of uninhabited houses to 4097; and the population to 864,825. The population of Paris is under 600,000. A recent publication says, "The situation of London with respect to navigation is peculiarly favourable, being neither too high nor too low. Had it been placed lower down on the river, it would not only have been annoyed by the marshes, but more liable to insults from foreign foes; and if it had been higher, it would not have been accessible, as it is at present, to ships of large burden. But its actual position is such as to give it every advantage that can be derived from a seaport, without any of its dangers. It also enjoys, by means of its noble river, a very extensive communication with the internal parts of the country, that supply it with every species of the necessaries of life, and receive from it, in return, those articles of commerce which they may respectively require." It is plentifully supplied with the very great and important article of fuel, by the navigation of its river from the northern collieries, which branch of commerce forms a principal nursery for seamen, independent of foreign trade; and is a very distinguished source of its naval superiority. With equal ease are corn and various other articles conveyed to it from all the maritime ports of the kingdom, as well as from foreign parts, whenever it is found necessary, in which great numbers of coasting vessels are constantly employed, and ships in foreign commerce occasionally exercised. The vast East India trade, with those to Turkey, and Hudson's Bay, till lately have been almost wholly confined to this port.

London contains, as nearly as we can collect, 150 parishes. 3 extra parochials. 1 cathedral. 1 abbey church. 102 parish churches, including Westminster. 287 chapels, of different denominations. 36 different courts of justice. 7 courts of request, for the recovery of small debts. 22 hospitals, for sick, lame, and other diseases. 16 dispensaries, to administer medicines to the poor. 93 alms-houses, wherein 976 old men and women are maintained. 1 asylum, for female orphans. 1 magdalen-house, for seduced women. 1 female penitentiary. 1 hospital, for old and disabled sailors. 1 ditto, for old and disabled soldiers. 44 free-schools, wherein 5000 boys and girls are completely educated and maintained, and some are also clothed. 165 parish charity schools, wherein 6208 boys and girls are educated, clothed and maintained, at the charge of their respective parishes. 3500 private schools, for the education of youth in all kinds of literature. 18 public libraries. 16 benevolent societies and institutions, of different denominations. 5 colleges. 18 trading and incorporated societies. 4 literary institutions. 42 markets, chiefly for meat, fish, poultry, herbs, hay, &c. 72 squares. 16 inns of court. 4 theatres-royal. 9 public gardens and places of diversions. 19 of the most frequented tea-gardens. 570 taverns. 350 inns. 656 coffee-houses. 6786 ale-houses. 17 prisons. 1 general post-office, and upwards of 300 receiving houses. 5 principal penny post-offices, and 346 receiving houses. 1200 hackney coaches. 400 sedan chairs. 10,000 boats and upwards.

The number of inhabitants are now computed to be, on an average, at 1,000,000, for the support of whom there are annually consumed, 5,092,075 bushels of meal, or wheat flower. 99,277 oxen. 714,830 sheep and lambs. 199,789 calves. 190,000 swine. 58,000 sucking-pigs. 106,373 bushels of oysters. 14,400,000 mackarel. 1379 boats of cod, haddock, and other sea-fish. 26,541,056 lbs. of butter. 19,066,000 lbs. of cheese. 6,717,204 gallons of milk. 1,176,529 barrels of strong beer. 789,796 barrels of small beer. 32,056 tuns of wine. 11,146,782 gallons of rum, brandy, geneva, and other compounds. 794,809 chaldron of coals. 400,000l. worth of oil for lamps.

This great and populous city is happily supplied with abundance of fresh water from the Thames and the New River; which is not only of inconceivable service to every family, but by means of fire-plugs every where dispersed, the keys of which are deposited with the parish officers, the city is in a great measure secured from the spreading of fire; for these plugs are no sooner opened than there are vast quantities of water to supply the engines. This plenty of water has been attended with another advantage, it has given rise to several companies, who insure houses and goods from fire; an advantage that is not to be met with in any other nation on earth: the premium is small, and the recovery in case of loss is easy and certain. Every one of these offices keeps a set of men in pay, who are ready at all hours to give their assistance in case of fire; and who are on all occasions extremely bold, dexterous and diligent: but though all their labours should prove unsuccessful, the person who suffers by this devouring element has the comfort that must arise from the certainty of being paid the value (upon oath) of what he has insured. London is the see of a bishop.

It is 136 miles N.W. of Paris, 180 W. by S. of Amsterdam, and 264 S.E. of Dublin. Lat. 51. 30. 46 N. Lon. 0. 5. 37 W. of Greenwich observatory.

London bridge water-works. See Engine.

London (New), a seaport in the state of Connecticut, and county of New London. Its harbour is the best in Connecticut, and as good as any in the United States. It is defended by two forts, and seated on the Thames, near its entrance into the Sound, 80 miles N.E. of New York. Lon. 72. 45 W. Lat. 41. 15 N.

London (New), a town of the United States, in Virginia, on James River, 133 miles W. by S. of Richmond.

London-pride. In botany. See Saxifraga.

London-strife. In botany. See Lysimachia; Epilobium; Lythrum; Gaura.

LONDONDERRY, or Coleraine, a county of Ireland, in the province of Ulster, 32 miles long and 30 broad; bounded on the W. by Donegal, on the N. by the ocean, on the S. and S.W. by Tyrone, and on the E. by Antrim. It contains 31 parishes, and sends eight members to parliament. It is a fruitful champaign country; and the greater part of it was given by James I. to an incorporated company of London merchants. The linen manufacture flourishes through every part of it.

Londonderry, a handsome town of Ireland, capital of a county of the same name. It is still surrounded by walls, and is remarkable for a long siege it sustained against James II. in 1689, till a naval force from England, with some troops under general Kirke, broke the boom across the harbour, and brought a seasonable relief; by which the enemy were so dispirited, as to raise the siege. It is a modern place, built by a company of London adventurers in the reign of James I. The principal commerce of Londonderry is with America and the West Indies. It contains 10,000 inhabitants, and is seated on the river Foyle, over which a wooden bridge 1068 feet in length, and of singular and excellent construction, was erected in 1791. Londonderry is four miles S. of Lough Foyle, and 104 N.W. of Dublin. Lon. 7. 5 W. Lat. 55. 4 N.

LONE. *a.* (contracted from *alone.*) 1. Solitary; having no company (*Savage*). 2. Single; not conjoined (*Pope*).

LO'NELINESS. *s.* (from *lonely.*) 1. Solitude; want of company (*Sidney*). 2. Disposition to solitude (*Shakspeare*).

LO'NELY. *a.* (from *lone.*) 1. Solitary (*Shakspeare*). 2. Addicted to solitude (*Rowe*).

LO'NENESS. *s.* (from *lone.*) Solitude; dislike of company (*Donne*).

LO'NESOME. *a.* (from *lone.*) Solitary; dismal (*Blackmore*).

LONG. *a.* (*longus*, Latin.) 1. Not short (*Luke*). 2. Having one of its geometrical dimensions in a greater degree than either of the other (*Boyle*). 3. Of any certain measure in length (*Pope*). 4. Not soon ceasing, or at an end (*Milton*). 5. Dilatory (*Ecclus.*). 6 Tedious in narration (*Prior*). 7. Continued by succession to a great series 8. (from the verb.) Longing; desirous (*Sid.*). 9. Protracted as, a long *syllable.*

Long. *ad.* 1. To a great length in space (*Prior*). 2. Not for a short time (*Fairfax*). 3. In the comparative, it signifies for more time; and in the superlative, for most time (*Exodus. Locke*). 4. Not soon (*Acts*). 5. At a point of duration far distant (*Tillotson*). 6. (for *along.*) All along; throughout (*Sh.*).

Long. *ad.* (ȝelanȝ, a fault, Sax.) By the fault; by the failure (*Shakspeare*).

*To* Long. *v. n.* (*gelangen*, German, to ask.) To desire earnestly; to wish with eagerness continued (*Fairfax*).

LONGA, *long*, in the Italian music, is a character marked thus, containing four semibreves, in common tune, and consequently eight minims. This note is seldom used now, except at a full cadence.

Long boat. See Boat.

Long measure. See Measure.

Long-legged spider. In entomology. See Phalangium.

Long (Roger), D. D. master of Pembroke-hall in Cambridge, Lowndes's professor of astronomy in that university, &c. was author of an ingenious pamphlet on the Greek accents, and of a well known and much approved treatise of astronomy, and the inventor of a remarkably curious astronomical machine. This was a hollow sphere of 18 feet diameter, in which more than 30 persons might sit conveniently. Withinside the surface, which represented the heavens, was painted the stars and constellations, with the zodiac, meridians, and axis parallel to the axis of the world, upon which it was easily turned round by a winch. He died December 16, 1770, at 91 years of age.

A few years before his death Mr. Jones gave some anecdotes of Dr. Long, as follows: "He is now in the 88th year of his age, and for his years vegete and active. He was lately put in nomination for the office of vice-chancellor: he executed that trust once before, I think in the year 1737. He is a very ingenious person, and sometimes very facetious. At the public commencement, in the year 1713, Dr. Greene (master of Bennet college, and afterwards bishop of Ely) being then vice-chancellor, Mr. Long was pitched upon for the tripos performance: it was witty and humorous, and has passed through divers editions. Some that remembered the delivery of it, told me, that in addressing the vice-chancellor (whom the university wags usually styled miss Greene) the tripos orator, being a native of Norfolk, and assuming the Norfolk dialect, instead of saying, 'Domine vice-cancellarie,' archly pronounced the words thus, 'Domina vice-cancellaria;' which occasioned a general smile in that great auditory. His friend, the late Mr. Boufoy, of Rippon, told me this little incident: that he and Dr. Long, walking together in Cambridge, in a dusky evening, and coming to a short post fixed in the pavement, which Mr. Boufoy, in

the midst of chat and inattention, took to be a boy standing in his way, he said in a hurry, 'Get out of my way, boy.' 'That boy, sir,' said the doctor, very calmly and slyly, 'is a post-boy, who turns out of his way for nobody.' I could recollect several other ingenious repartees, if there were occasion. One thing is remarkable, he never was a hale and hearty man, always of a tender and delicate constitution, yet took great care of it; his common drink water; he always dines with the fellows in the hall. Of late years he has left off eating flesh-meats; in the room thereof puddings, &c. sometimes a glass or two of wine."

Long (James le), a priest of the oratory, was born at Paris in 1665, and died librarian of St. Honoré in that city in 1721. His chief works are, 1. Bibliotheca Sacra, 2 vols. folio, 1723; 2. Bibliotheque Historique de la France, folio; 3. An Historical Discourse on Polyglott Bibles.

LONGANI'MITY. *s.* (*longanimitas*, Latin.) Forbearance; patience of offences (*Howel*).

LO'NGBOAT. *s.* The largest boat belonging to a ship (*Wotton*).

LONGE'VITY. *s.* (*longævus*, Lat.) Length of life (*Arbuthnot*).

Longevity is sometimes employed to denote the continuance of life beyond its ordinary period of duration. The term of human life does not in general much exceed 80 years, but it is well known that instances occasionally occur of persons living to the age of 100 years and upwards. Such instances however have not excited that general attention which from the nature of the subject might be expected, and it is only of late years that any extensive collection of them has been formed, or attempts made to ascertain the circumstances and situations in which the different individuals preserved their lives to an age so much beyond the usual lot of man. See Life.

LONGFORD, a county of Ireland, in the province of Leinster, 25 miles long and 16 broad; bounded on the E. and S. by W. Meath, on the N.W. by Leitrim, on the N.E. by Cavan, and on the W. by the Shannon, which parts it from Roscommon. It is a rich and pleasant country, contains 24 parishes, and sends 10 members to parliament.

Longford, a town of Ireland, situated on the river Cromlin, in the county of Longford and province of Leinster, 64 miles from Dublin; which river falls a few miles below this place into the Shannon. It is a borough, post, market, and fair town; and returns two members to parliament; patron, lord Longford. It gave title of earl to the family of Aungier; of viscount, to the family of Micklethwaite; and now gives that of baron to the family of Packenham. Within a mile and a half of the town is a charter-school for above 40 children. This place has a barrack for a troop of horse. It is large and well built; and in a very early age an abbey was founded here, of which St. Idus, one of St. Patrick's disciples, was abbot. In the year 1400, a fine monastery was founded to the honour of the Virgin Mary, for Dominican friars, by O'Ferral prince of Annaly. This monastery being destroyed by fire, pope Martin V. by a bull in the year 1429, granted an indulgence to all who should contribute to the re-building of it. In 1433, pope Eugene IV. granted a bull to the same purpose; and in 1438 he granted another to the like effect. The church of this friary, now the parish church, is in the diocese of Ardagh. The fairs are four in the year.

LONG-ISLAND, is an island of North America, belonging to the state of New-York, which is separated from the continent by a narrow channel. It extends from the city of New-York east 140 miles, terminating with Montauk point; and is not more than 10 miles in breadth on a medium. It is divided into three counties, King's, Queen's, and Suffolk. The south side of the island is flat land, of a light sandy soil, bordered on the sea-coast with large tracts of salt meadow, extending from the west point of the island to Southampton. This soil, however, is well calculated for raising grain, especially Indian corn. The north side of the island is hilly, and of a strong soil, adapted to the culture of grain, hay, and fruit. A ridge of hills extends from Jamaica to Southhold. Large herds of cattle feed upon Hampstead plain and on the salt marshes upon the south side of the island. Hampstead plain in Queen's county is a curiosity. It is 16 miles in length, east and west, and 7 or 8 miles wide. The soil is black, and to appearance rich, and yet it was never known to have any natural growth, but a kind of wild grass and a few shrubs. It is frequented by vast numbers of plover. Rye grows tolerably well on some parts of the plain. The most of it lies common for cattle, horses, and sheep. As there is nothing to impede the prospect in the whole length of this plain, it has a curious but tiresome effect upon the eye, not unlike that of the ocean. The island contains 30,863 inhabitants.

LONGI'MANOUS. *a.* (*longimanus*, Latin.) Longhanded; having long hands (*Brown.*)

LONGI'METRY. *s.* (*longus* and μετρεω; *longimetrie*, French.) The art or practice of measuring distances, whether accessible or inaccessible. See Distance, Trigonometry, &c.

LONGING, is a preternatural appetite in pregnant women, and in some sick persons when about to recover. It is called *pica* from the bird of that name, which is said to be subject to the same disorder. The disorder consists of both a desire of unusual things to eat and drink, and in being soon tired of one and wanting another. It is called *malacia*, from μαλακος, "weakness." In pregnant women it is somewhat relieved by bleeding, and in about the fourth month of their pregnancy it leaves them. Chlorotic girls, and men who labour under suppressed hemorrhoids, are very subject to this complaint, and are relieved by promoting the respective evacuations. In general, whether this disorder is observed in pregnant

women, in persons recovering from an acute fever, or in those who labour under obstructions of the natural evacuations, the cravings should be moderately indulged.

LO'NGINGLY. *ad.* (from *longing.*) With incessant wishes (*Dryden*).

LONGINIÇO, a town of Turkey in Europe, in the Morea, anciently called Olympia, famous for being the place where the Olympic games were celebrated, and for the temple of Jupiter Olympus, about a mile distant. It is now but a small place, seated on the river Alpheus, 10 miles from its mouth, and 50 south of Lepanto. E. lon. 22. 0. N. lat. 37. 30.

LONGINUS (Dionysius Cassius), a celebrated Greek critic of the third century, was probably an Athenian. His father's name is unknown, but by his mother he was allied to the celebrated Plutarch. His youth was spent in travelling with his parents, which gave him an opportunity to increase his knowledge, and improve his mind. After his travels, he fixed his residence at Athens, and with the greatest assiduity applied to study. Here he published his Treatise on the Sublime; which raised his reputation to such a height, and gave the Athenians such an opinion of his judgment and taste, that they made him sovereign judge of all authors, and every thing was received and rejected by the public according to his decisions. He seems to have staid at Athens a long time; here he taught the academic philosophy, and among others had the famous Porphyry for his pupil. But it was at length his fortune to be drawn from Athens, and to mix in more active scenes; to train up young princes to virtue and glory; to guide the busy passions of the great to noble objects; to struggle for, and at last to die in, the cause of liberty. Zenobia, queen of the East, prevailed on him to undertake the education of her sons; and he soon gained an uncommon share in her esteem: she spent the vacant hours of her life in his conversation, and modelled her sentiments and conduct by his instructions. That princess was at war with Aurelian; and, being defeated by him near Antioch, was compelled to shut herself up in Palmyra, her capital city. The emperor wrote her a letter, in which he ordered her to surrender; to which she returned an answer, drawn up by Longinus, which filled him with resentment. The emperor laid siege to the city; and the Palmyrans were at length obliged to open their gates and receive the conqueror. The queen and Longinus endeavoured to fly into Persia; but were unhappily overtaken and made prisoners when they were on the point of crossing the Euphrates. The queen, intimidated, weakly laid the blame of vindicating the liberty of her country on its true author; and the brave Longinus, to the disgrace of the conqueror, was carried away to immediate execution. The writings of Longinus were numerous, some on philosophical, but the greater part on critical subjects. Dr. Pearce has collected the titles of 25 treatises, none of which, excepting that on the Sublime, have escaped the depredations of time and barbarians. On this imperfect piece the great fame of Longinus is raised, who, as Pope expresses it, "is himself the great sublime he draws." A good edition of his works is that by Tullius, printed at Utrecht in 1694, *cum notis variorum.* We must also mention the edition of Toup with Ruhnkenius's emendations, published in 4to at Oxford in 1778, and in 8vo in 1789. "This," says Dr. A. Clarke, "is a very excellent edition, by one of the best Greek scholars and best qualified critics in Europe. Mr. Toup is to Longinus what Longinus is to Homer." Longinus has been translated into English by Mr. Smith.

LONGI'SSIMUS DORSI. In anatomy. This muscle, which is somewhat thicker than the sacro lumbalis, greatly resembles it, however, in its shape and extent, and arises, in common with that muscle, between it and the spine. It ascends upwards along the spine, and is inserted by small double tendons into the posterior and inferior part of all the transverse processes of the vertebræ of the back, and sometimes of the last vertebræ of the neck. From its outside it sends off several bundles of fleshy fibres, interspersed with a few tendinous filaments, which are usually inserted into the lower edge of the ten uppermost ribs, not far from their tubercles. In some subjects, however, they are found inserted into a less number, and in others, though more rarely, into every one of the ribs. Towards the upper part of this muscle is observed a broad and thin portion of fleshy fibres, which cross and intimately adhere to the fibres of the longissimus dorsi. This portion arises from the upper and posterior part of the transverse processes of the five or six uppermost vertebræ of the back, by as many tendinous origins, and is usually inserted by six tendinous and fleshy slips, into the transverse processes of the six inferior vertebræ of the neck. This portion is described by Winslow and Albinus as a distinct muscle; by the former under the name of transversalis major colli, and by the latter under that of transversalis cervicis. But its fibres are so intimately connected with those of the longissimus dorsi, that it may very properly be considered as an appendage to the latter. The use of this muscle is to extend the vertebræ of the back, and to keep the trunk of the body erect; by means of its appendage it likewise serves to turn the neck obliquely backwards, and a little to one side.

LO'NGITUDE. *s.* (*longitude*, French.) 1. Length; the greatest dimension (*Wotton*). 2. The circumference of the earth measured from any meridian (*Abbot*). 3. The distance of any part of the earth to the east or west of any place (*Arbuthnot*). 4. The position of any thing to east or west (*Brown*).

LONGITUDE *of the Earth*, is sometimes used to denote its extent from west to east, according to the direction of the equator. By which it stands contra-distinguished from the latitude of the earth, which denotes its extent from one pole to the other.

LONGITUDE *of a Place*, in geography, is its longitudinal distance from some first meridian, or an

arch of the equator intercepted between the meridian of that place and the first meridian.

**Longitude** *in the Heavens*, as of a star, &c. is an arch of the ecliptic, counted from the beginning of Aries, to the place where it is cut by a circle perpendicular to it, and passing through the place of the star.

**Longitude** *of the Sun or Star from the next equinoctial point*, is the degrees they are distant from the beginning of Aries or Libra, either before or after them; which can never exceed 180 degrees.

**Longitude**, *Geocentric*, *Heliocentric*, &c. the longitude of a planet as seen from the earth, or from the sun. See the respective terms.

**Longitude**, in navigation, is the distance of a ship, or place, east or west, from some other place or meridian, counted in degrees of the equator. When this distance is counted in leagues, or miles, or in degrees of the meridian, and not in those proper to the parallel of latitude, it is usually called *departure*.

An easy practicable method of finding the longitude at sea is the only thing wanted to render the art of navigation perfect, and is a problem that has greatly perplexed mathematicians for the last two centuries: accordingly most of the commercial nations of Europe have offered great rewards for the discovery of it; and in consequence very considerable advances have been made towards a perfect solution of the problem, especially by the English.

In the year 1598 the government of Spain offered a reward of 1000 crowns for the solution of this problem; and soon after the States of Holland offered 10 thousand florins for the same. Encouraged by such offers, in 1635, M. John Morin, professor of mathematics at Paris, proposed to cardinal Richlieu a method of resolving it; and though the commissioners who were appointed to examine this method, on account of the imperfect state of the lunar tables, judged it insufficient, cardinal Mazarin, in 1645, procured for the author a pension of 2000 livres.

A whimsical method of finding the longitude was proposed by Messrs. Whiston and Ditton from the report and flash of great guns. The motion of sound is known to be nearly equable, from whatever body it proceeds, or whatever be the medium. Supposing therefore a mortar to be fired at any place, the longitude of which is known, the difference between the moment that the flash is seen and the report heard will give the distance between the two places; whence, if we know the latitudes of these places, their longitudes must also be known. If the exact time of the explosion be known at the place where it happens, the difference of time at the place where it is heard will likewise give the difference of longitude. Let us next suppose the mortar to be loaded with an iron shell filled with combustible matter, and fired perpendicularly upward into the air, the shell will be carried to the height of a mile, and will be seen at the distance of near 100; whence, supposing neither the flash of the mortar should be seen nor the report heard, still the longitude must be determined by the altitude of the shell above the horizon.

According to this plan, mortars were to be fired at certain times and at proper stations along all frequented coasts for the direction of mariners. This indeed might be of use, and in stormy weather might be a kind of improvement in lighthouses, or a proper addition to them; but with regard to the determination of longitudes is evidently ridiculous.

In 1714 an act was passed in the British parliament, allowing 2000l. towards making experiments; and also offering a reward to the person who should discover the longitude at sea, proportioned to the degree of accuracy that might be attained by such discovery: viz. a reward of 10,000l. if it determines the longitude to one degree of a great circle, or 60 geographical miles; 15,000l. if it determines the same to two-thirds of that distance; and 20,000l. if it determines it to half that distance; with other regulations and encouragements. 12 Ann. cap. 15. See also stat. 14 Geo. II. cap. 39, and 26 Geo. II. cap. 25. But, by stat. Geo. III. all former acts concerning the longitude at sea are repealed, except so much of them as relates to the appointment and authority of the commissioners, and such clauses as relate to the publishing of nautical almanacs, and other useful tables; and it enacts, that any person who shall discover a method for finding the longitude by means of a time-keeper, the principles of which have not hitherto been made public, shall be entitled to the reward of 5000l. if it shall enable a ship to keep her longitude, during a voyage of 6 months, within 60 geographical miles, or one degree of a great circle; to 7500l. if within 40 geographical miles, or two-thirds of a degree of a great circle; or to a reward of 10,000l. if within 30 geographical miles, or half a degree of a great circle. But if the method shall be by means of improved solar and lunar tables, the author of them shall be entitled to a reward of 5000l. if they shew the distance of the moon from the sun and stars within 15′ of a degree, answering to about 7′ of longitude, after making an allowance of half a degree for the errors of observation, and after comparison with astronomical observations for a period of 18½ years, or during the period of the irregularities of the lunar motions. Or that in case any other method shall be proposed for finding the longitude at sea, besides those before-mentioned, the author shall be entitled to 5000l. if it shall determine the longitude within one degree of a great circle, or sixty geographical miles; to 7500l. if within two-thirds of that distance; and to 10,000l. if within half the said distance.

Accordingly, many attempts have been made for such discovery, and several ways proposed, with various degress of success. These however have been chiefly directed to methods of determining the difference of time between any two points on the earth; for the longitude of any place being an arch of the equator intercepted between two meridians, and this arc being proportional to the time required by the sun to move from the one meridian to the other, at the rate of 4 minutes of time to one degree of the arch, it follows that the difference of time being known, and turned into degrees according to that proportion, it will give the longitude.

This measurement of time has been attempted by some persons by means of clocks, watches, and other automata: for if a clock or watch were contrived to go uniformly at all seasons, and in all places and situations; such a machine being regulated, for instance, to London or Greenwich time, would always shew the time of the day at London or Greenwich, wherever it should be carried to; then the time of the day at this place being found by observations, the difference between these two times would give the difference of longitude, according to the proportion of one degree to 4 minutes of time.

Gemma Frisius, in his tract De Principiis As-

tronomiæ et Geographiæ, printed at Antwerp in 1530, it seems first suggested the method of finding the longitude at sea by means of watches, or time-keepers; which machines, he says, were then but lately invented. And soon after, the same was attempted by Metius, and some others; but the state of watch-making was then too imperfect for that purpose. Dr. Hooke and Mr. Huygens also, about the year 1664, applied the invention of the pendulum-spring to watches; and employed it for the purpose of discovering the longitude at sea. Some disputes however between Dr. Hooke and the English ministry prevented any experiments from being made with watches constructed by him; but many experiments were made with some constructed by Huygens; particularly Major Holmes, in a voyage from the coast of Guinea in 1665, by one of these watches predicted the longitude of the island of Fuego to a great degree of accuracy. This success encouraged Huygens to improve the structure of his watches (see Philos. Trans. for May 1669); but experience soon convinced him, that unless methods could be discovered for preserving the regular motion of such machines, and preventing the effects of heat and cold, and other disturbing causes, they could never answer the intention of discovering the longitude, and on this account his attempts failed.

The first person who turned his thoughts this way, after the public encouragement held out by the act of 1714, was Henry Sully, an Englishman; who, in the same year, printed at Vienna a small tract on the subject of watch-making; and afterwards removing to Paris, he employed himself there in improving time-keepers for the discovery of the longitude. It is said he greatly diminished the friction in the machine, and rendered uniform that which remained: and to him is principally to be attributed what is yet known of watch-making in France: for the celebrated Julien le Roy was his pupil, and to him owed most of his inventions, which he afterwards perfected and executed: and this gentleman, with his son, and M. Berthoud, are the principal persons in France who have turned their thoughts this way since the time of Sully. Several watches made by these last two artists have been tried at sea, it is said with good success, and large accounts have been published of these trials.

In the year 1726 our countryman, Mr. John Harrison, produced a time-keeper of his own construction, which did not err above one second in a month, for 10 years together: and in the year 1736 he had a machine tried in a voyage to and from Lisbon; which was the means of correcting an error of almost a degree and a half in the computation of the ship's reckoning. In consequence of this success Mr. Harrison received public encouragement to proceed, and he made three other time-keepers, each more accurate than the former, which were finished successively in the years 1739, 1758, and 1761; the last of which proved so much to his own satisfaction, that he applied to the commissioners of the longitude to have this instrument tried in a voyage to some port in the West Indies, according to the directions of the statute of the 12th of Anne above cited. Accordingly, Mr. William Harrison, son of the inventor, embarked in November 1761, on a voyage for Jamaica, with his 4th time-keeper or watch; and on his arrival there, the longitude, as shewn by the time-keeper, differed but one geographical mile and a quarter from the true longitude, deduced from astronomical observations. The same gentleman returned to England, with the time-keeper, in March 1762; when he found that it had erred, in the 4 months, no more than 1′ 54½ in time, or 28⅝ minutes of longitude; whereas the act requires no greater exactness than 30 geographical miles, or minutes of a great circle, in such a voyage. Mr. Harrison now claimed the whole reward of 20,000l. offered by the said act; but some doubts arising in the minds of the commissioners concerning the true situation of the island of Jamaica, and the manner in which the time at that place had been found, as well as at Portsmouth; and it being farther suggested by some, that although the time-keeper happened to be right at Jamaica, and after its return to England, it was by no means a proof that it had been always so in the intermediate times; another trial was therefore proposed, in a voyage to the island of Barbadoes, in which precautions were taken to obviate as many of these objections as possible. Accordingly, the commissioners previously sent out proper persons to make astronomical observations at that island, which, when compared with other corresponding ones made in England, would determine, beyond a doubt, its true situation: and Mr. William Harrison again set out with his father's time-keeper, in March 1764, the watch having been compared with equal altitudes at Portsmouth before he set out, and he arrived at Barbadoes about the middle of May; where, on comparing it again by equal altitudes of the sun, it was found to shew the difference of longitude, between Portsmouth and Barbadoes, to be 3h 55m 3s; the true difference of longitude between these places, by astronomical observations, being 3h 54m 20s; so that the error of the watch was 43s, or 10′ 45″ of longitude. In consequence of this and the former trials Mr. Harrison received one moiety of the reward offered by the 12th of queen Anne, after explaining the principles on which his watch was constructed, and delivering this as well as the three former to the commissioners of the longitude for the use of the public; and he was promised the other moiety of the reward, when other time-keepers should be made, on the same principles, either by himself or others, performing equally well with that which he had last made. In the mean time, this last time-keeper was sent down to the Royal Observatory at Greenwich, to be tried there under the direction of the rev. Dr. Maskelyne, the astronomer royal. But it did not appear during this trial that the watch went with the regularity that was expected; from which it was apprehended, that the performance even of the same watch was not at all times equal; and consequently that little certainty could be expected in the performance of different ones. Moreover, the watch was now found to go faster than during the voyage to and from Barbadoes, by 18 or 19 seconds in 24 hours: but this circumstance was accounted for by Mr. Harrison; who informs us that he had altered the rate of its going by trying some experiments, which he had not time to finish before he was ordered to deliver up the watch to the board. Soon after this trial, the commissioners of longitude agreed with Mr. Kendal, one of the watch-makers appointed by them to receive Mr. Harrison's discoveries, to make another watch on the same construction with this, to determine whether such watches could be made, from the account which Mr. Harrison had given, by other persons, as well as himself. The event proved the affirmative; for the watch produced by Mr. Kendal, in consequence of this agreement,

went considerably better than Mr. Harrison's did. Mr. Kendal's watch was sent out with capt. Cook, in his second voyage towards the south pole and round the globe, in the year 1772, 1773, 1774, and 1775; when the only fault found in the watch was, that its rate of going was continually accelerated; though in this trial, of 3 years and a half, it never amounted to $14''\frac{1}{2}$ a day. The consequence was, that the House of Commons in 1774, to whom an appeal had been made, were pleased to order the second moiety of the reward to be given to Mr. Harrison, and to pass the act above mentioned. Mr. Harrison had also at different times received some other sums of money, as encouragements to him to continue his endeavours, from the board of longitude, and from the India company, as well as from many individuals. Mr. Arnold, Mr. Earnshaw, and some other persons, have since also made several very good watches for the same purpose.

Others have proposed various astronomical methods for finding the longitude. These methods chiefly depend on having an ephemeris or almanac suited to the meridian of some place, as Greenwich for instance, to which the Nautical Almanac is adapted, which shall contain for every day computations of the times of all remarkable celestial motions and appearances, as adapted to that meridian. So that, if the hour and minute be known when any of the same phenomena are observed in any other place, whose longitude is desired, the difference between this time and that to which the time of the said phenomenon was calculated and set down in the almanac will be known, and consequently the difference of longitude also becomes known between that place and Greenwich, allowing at the rate of 15 degrees to an hour.

Now it is easy to find the time at any place, by means of the altitude or azimuth of the sun or stars; which time it is necessary to find by such means, both in these astronomical modes of determining the longitude, and in the former by a time-keeper; and it is the difference between that time, so determined, and the time at Greenwich, known either by the time-keeper or by the astronomical observations of celestial phenomena, which gives the difference of longitude, at the rate above-mentioned. Now the difficulty in these methods lies in the fewness of proper phenomena capable of being thus observed; for all slow motions, such as belong to the planet Saturn for instance, are quite excluded, as affording too small a difference, in a considerable space of time, to be properly observed; and it appears that there are no phenomena in the heavens proper for this purpose, except the eclipses or motions of Jupiter's satellites, and the eclipses or motions of the moon, viz. such as her distance from the sun or certain fixed stars lying near her path, or her longitude or place in the zodiac, &c. Now of these methods,

1st, That by the eclipses of the moon is very easy, and sufficiently accurate, if they did but happen often, as every night. For at the moment when the beginning, or middle, or end of an eclipse is observed by a telescope, there is no more to be done but to determine the time by observing the altitude or azimuth of some known star; which time being compared with that in the tables, set down for the happening of the same phenomenon at Greenwich, gives the difference in time, and consequently of longitude sought. But as the beginning or end of an eclipse of the moon cannot generally be observed nearer than one minute, and sometimes 2 or 3 minutes of time, the longitude cannot certainly be determined by this method, from a single observation, nearer than one degree of longitude. However, by two or more observations, as of the beginning and end, &c. a much greater degree of exactness may be attained.

2d, The moon's place in the zodiac is a phenomenon more frequent than that of her eclipses; but then the observation of it is difficult, and the calculus perplexed and intricate, by reason of two parallaxes; so that it is hardly practicable, to any tolerable degree of accuracy.

3d, *The longitude may be found by the moon's culminating*, thus:—Seek in the ephemeris for the time of her coming to the meridian on the given day and on the day following, and take their difference; also take the difference betwixt the times of culminating on the same day as found in the ephemeris, and as observed; then say, As the daily difference in the ephemeris is to the difference between the ephemeris and observation; so is 360 degrees to the difference of longitude. In this method however a small difference in the culmination will occasion a great one in the longitude.

4th, But the moon's distances from the sun, or certain fixed stars, are phenomena to be observed many times in almost every night, and afford a good practical method of determining the longitude of a ship at almost any time; either by computing, from thence, the moon's true place, to compare with the same in the almanac; or by comparing her observed distance itself with the same as there set down.

It is said that the first person who recommended the finding the longitude from this observed distance between the moon and some star was John Werner, of Nuremberg, who printed his annotations on the first book of Ptolomy's Geography in 1514. And the same thing was recommended in 1524 by Peter Apian, professor of mathematics at Ingolstadt; also about 1530 by Oronce Finé, of Briançon; and the same year by the celebrated Kepler, and by Gemma Frisius, at Antwerp; and in 1560 by Nonius, or Pedro Nunez.

Nor were the English mathematicians behindhand on this head. In 1665 sir Jonas Moore prevailed on king Charles the Second to erect the Royal Observatory at Greenwich, and to appoint Mr. Flamsteed his astronomical observer, with this express command, that he should apply himself with the utmost care and diligence to the rectifying the table of the motions of the heavens, and the places of the fixed stars, in order to find out the so much desired longitude at sea for perfecting the art of navigation. And to the fidelity and industry with which Mr. Flamsteed executed his commission it is that we are chiefly indebted for that curious theory of the moon, which was afterwards formed by the immortal Newton. This incomparable philosopher made the best possible use of the observations with which he was furnished; but as these were interrupted and imperfect, his theory would sometimes differ from the heavens by 5 minutes or more.

Dr. Halley bestowed much time on the same object; and a Starry Zodiac was published under his direction, containing all the stars to which the moon's appulse can be observed; but for want of correct tables, and proper instruments, he could not proceed in making the necessary observations. In a paper on this subject in the Philos. Trans. number 421, he expresses his hope, that the instrument just invented by Mr. Hadley might be applied to taking angles at sea with the desired accuracy. This great astronomer, and after him the

Abbe de la Caille, and others, have reckoned the best astronomical method for finding the longitude at sea, to be that in which the distance of the moon from the sun or from a star is used; for the moon's daily motion being about 13 degrees, her hourly mean motion is above half a degree, or one minute of a degree in two minutes of time; so that *an error of one minute of a degree in position will produce an error of two minutes in time, or half a degree in longitude.* Now from the great improvements made by Newton in the theory of the moon, and more lately by Euler and others on his principles, professor Mayer, of Gottengen, was enabled to calculate lunar tables more correct than any former ones; having so far succeeded as to give the moon's place within one minute of the truth, as has been proved by a comparison of the tables with the observations made at the Greenwich observatory by the late Dr. Bradley, and by Dr. Maskelyne, the present astronomer royal: the same have been still farther improved under his direction by the late Mr. Charles Mason, by several new equations, and the whole computed to tenths of a second. These new tables, when compared with the above-mentioned series of observations, a proper allowance being made for the unavoidable error of observation, seem to give always the moon's longitude in the heavens correctly within 30 seconds of a degree; which greatest error, added to a possible error of one minute in taking the moon's distance from the sun or a star at sea, will at a medium only produce an error of 42 minutes of longitude. To facilitate the use of the tables, Dr. Maskelyne proposed a nautical ephemeris, the scheme of which was adopted by the commissioners of longitude, and first executed in the year 1767, since which time it has been regularly continued, and published as far as for the year 1800. But as the rules that were given in the appendix to one of those publications, for correcting the effects of refraction and parallax, were thought too difficult for general use, they have been reduced to tables. So that, by the help of the ephemeris, these tables, and others that are also provided by the board of longitude, the calculations relating to the longitude, which could not be performed by the most expert mathematician in less than four hours, may now be completed with great ease and accuracy in half an hour.

As this method of determining the longitude depends on the use of the tables annually published for this purpose, those who wish for farther information are referred to the instructions that accompany them, and particularly to those that are annexed to the tables requisite to be used with the Astronomical and Nautical Ephemeris, 3d edit. Also to Mackay's useful treatise on The Theory and Practice of finding the Longitude at Sea or Land, and to capt. Mendoza Rios's Complete Collection of Tables for Navigation and Nautical Astronomy, where the ingenious formulæ given by himself, by the late Mr. H. Cavendish, and others, are illustrated and exemplified.

5th, The phenomena of Jupiter's satellites have commonly been preferred to those of the moon for finding the longitude; because they are less liable to parallaxes than these are, and besides they afford a very commodious observation whenever the planet is above the horizon. Their motion is very swift, and must be calculated for every hour. These satellites of Jupiter were no sooner announced by Galileo, in his Syderius Nuncius, first printed at Venice in 1610, than the frequency of their eclipses recommended them for this purpose; and among those who treated on this subject, none was more successful than Cassina. This great astronomer published, at Bologna, in 1688, tables for calculating the appearances of their eclipses, with directions for finding the longitudes of places by them; and being invited to France by Louis the Fourteenth, he there, in the year 1693, published more correct tables of the same. But the mutual attractions of the satellites rendering their motions very irregular, those tables soon became useless for this purpose; insomuch that they require to be renewed from time to time; a service which has been performed by several ingenious astronomers, as Dr. Pound, Dr. Bradley, M. Cassini the son, and more especially by Mr. Wargentin, whose tables are much esteemed, which have been published in several places, as also in the Nautical Almanacs for 1771 and 1779.

Now, to find the longitude by these satellites; with a good telescope observe some of their phenomena, as the conjunction of two of them, or of one of them with Jupiter, &c.; and at the same time find the hour and minute, from the altitudes of the stars, or by means of a clock or watch, previously regulated for the place of observation; then, consulting tables of the satellites, observe the time when the same appearance happens in the meridian of the place for which the tables are calculated; and the difference of time, as before, will give the longitude.

The eclipses of the first and second of Jupiter's satellites are the most proper for this purpose; and as they happen almost daily, they afford a ready means of determining the longitude of places at land, having indeed contributed much to the modern improvements in geography; and if it were possible to observe them with proper telescopes in a ship under sail, they would be of great service in ascertaining its longitude from time to time. To obviate the inconvenience to which these observations are liable from the motions of the ship, a Mr. Irwin invented what he called a marine chair; this was tried by Dr. Maskelyne in his voyage to Barbadoes, when it was not found that any benefit could be derived from the use of it. Indeed, considering the great power requisite in a telescope proper for these observations, and the violence, as well as the irregularities in the motion of a ship, it is to be feared that the complete management of a telescope on ship-board will always remain among the desiderata in this part of nautical science. Farther, since all methods that depend on the phenomena of the heavens have also this other defect, that they cannot be observed at all times, this renders the improvement of time-keepers of the greater importance.

For approximate constructions for clearing the lunar distances from the effects of parallax and refraction, the reader may consult Kelly's Spherics and Nautical Astronomy, H. Clarke's Seaman's Desiderata and Repertory of Arts, &c. vol. v. And for more detailed information respecting the above and other methods of ascertaining the longitude, see Dr. Mackay's and Mr. Mendoza Rios's valuable works already referred to; also Vince's Astronomy, vol. 2, pa. 515 to 560, and O. Gregory's Astronomy, pa. 446 to 470.

LONGITU'DINAL. *a.* (*longitudinal*, Fr.) Measured by the length; running in the longest direction (*Cheyne*).

LONGITUDINAL SINUS. In anatomy, Longitudinal sinus of the dura mater. A triangular canal, proceeding in the falciform pro-

cess of the dura mater, immediately under the bones of the skull, from the crista galli to the tentorium, where it branches into the lateral sinusses. The longitudinal sinus has a number of trabeculæ or fibres crossing it. Its use is to receive the blood from the veins of the pia mater, and convey it into the lateral sinusses, to be carried through the internal jugulars to the heart.

LO'NGLY. *ad.* (from *long.*) Longingly; with great liking (*Shakspeare*).

LONGOMONTANUS (Christian), a learned astronomer, born in Denmark in 1562, in the village of Longomontum, whence he took his name. Vossius, by mistake, calls him Christopher. Being the son o. a poor man, a ploughman, he was obliged to suffer, during his studies, all the hardships to which he could be exposed, dividing his time, like the philosopher Cleanthes, between the cultivation of the earth and the lessons he received from the minister of the place. At length, at 15 years old, he stole away from his family, and went to Wiburg, where there was a college, in which he spent 11 years; and though he was obliged to earn his livelihood as he could, his close application to study enabled him to make a great progress in learning, particularly in the mathematical sciences.

From hence he went to Copenhagen; where the professors of that university soon conceived a very high opinion of him, and recommended him to the celebrated Tycho Brahe; with whom Longomontanus lived 8 years, and was of great service to him in his observations and calculations. At length, being very desirous of obtaining a professor's chair in Denmark, Tycho Brahe consented, with some difficulty, to his leaving him; giving him a discharge filled with the highest testimonies of his esteem, and furnishing him with money for the expence of his long journey from Germany, whither Tycho had retired.

He accordingly obtained a professorship of mathematics in the university of Copenhagen in 1605; the duty of which he discharged very worthily till his death, which happened in 1647, at 85 years of age.

Longomontanus was author of several works, which shew great talents in mathematics and astronomy. The most distinguished of them is his Astronomica Danica, first printed in 4to, 1621, and afterwards in folio in 1640, with augmentations. He amused himself with endeavouring to square the circle, and pretended that he had made the discovery of it; but our countryman Dr. J. Pell attacked him warmly on that subject, and proved that he was mistaken. It is remarkable that, obscure as his village and father were, he contrived to dignify and eternize them both; for he took his name from his village, and in the title-page to some of his works he wrote himself *Christianus Longomontanus Severini filius*, his father's name being Severin or Severinus.

LO'NGSOME. *a.* (from *long.*) Tedious; wearisome by its length (*Bacon*).

LO'NGSUFFERING. *a.* (*long* and *suffering.*) Patient; not easily provoked (*Exodus*).

LO'NGSUFFERING. *s.* Patience of offence; clemency (*Rogers*).

LO'NGTAIL. *s.* (*long* and *tail.*) Cut and long tail: a canting term for one or another. (*Shakspeare*).

LONGTOWN, a town of Cumberland, on the Scots borders, near the conflux of the Esk and Kirksop, seven miles from Carlisle, and 313 miles from London. It has a market on Thursday, and a charity school for 60 children, with two fairs in the year.

LONGUEIL (Gilbert de), a learned physician, born at Utrecht in 1507. He published a Greek and Latin Lexicon; Remarks on different classic Authors, and other works.

LONGUEIL (Christopher de), an eminent scholar, was born at Malines in 1490. He was in favour with several crowned heads, particularly pope Leo X. who set him to write against Luther. He wrote besides, Commentaries in Latin on Pliny's Book of Plants, and Observations on the Civil Law. He died at Padua, in 1522.

LONGUEVILLE, a town of France, in the department of Lower Seine, and late province of Normandy, seated on a small river, 23 miles N. of Rouen.

LONGUS, a Greek sophist, author of a book entitled Ποιμενικα, or Pastorals, and a romance containing the loves of Daphnis and Chloe. Huetius, bishop of Avranches, speaks very advantageously of this work; but he censures the obscene touches with which it is interspersed. None of the ancient authors mention him, so the time when he lived cannot be certainly fixed. There is an English translation of this author, which is ascribed to the late J. Craggs, Esq. secretary of state.

LONFUS COLLI. In anatomy, a pretty considerable muscle, situated close to the anterior and lateral part of the vertebræ of the neck. Its outer edge is in part covered by the rectus internus major. It arises tendinous and fleshy within the thorax, from the bodies of the three superior vertebræ of the back, laterally; from the bottom and fore part of the transverse processes of the first and second vertebræ of the back, and of the last vertebræ of the neck: and likewise from the upper and anterior points of the transverse processes of the sixth, fifth, fourth, and third vertebræ of the neck, by as many small distinct tendons; and is inserted tendinous into the fore part of the second vertebræ of the neck, near its fellow. This muscle, when it acts singly, moves the neck to one side; but, when both act, the neck is brought directly forwards.

LO'NGWAYS. *ad.* In the longitudinal direction. Properly *longwise* (*Addison*).

LO'NGWINDED. *a.* (*long* and *wind.*) Long-breathed; tedious (*Swift*).

LO'NGWISE. *ad.* (*long* and *wise.*) In the longitudinal direction (*Bacon*).

LONGWY, a town of France, in the department of Moselle, and late duchy of Lorrain, with a castle. It is divided into the old and new town, the latter of which is fortified. It was taken by the king of Prussia in 1792, but retaken two months after. It is seated on an

eminence, 15 miles S.W. of Luxemburg, and 167 N.E. of Paris. Lon. 5. 58 E. Lat. 49. 30 N.

LONI'CERA. Woodbine. Honeysuckle. In botany, a genus of the class pentandria, order monogynia; corol one-petalled, irregular; berry many-seeded, inferior. Twenty species: chiefly common to Europe and America: three indigenous to the woods, hedges, and coppices of our own country; they may be thus subdivided:

A. Stem twining.

B. Peduncles two-flowered.

C. Stem erect; peduncles many-flowered.

The following are the chief varieties:

1. L. semper virens. Trumpet-flowered evergreen honeysuckle, a native of Mexico and Virginia; naked terminal spikes; leaves oblong, the uppermost united and perfoliate; corols nearly equal; the tube dilated upwards. The flowers are of a deep scarlet hue, very beautiful, but nearly inodorous. The plant may be propagated by layers, cuttings or seeds. The layers should be put down in the autumn, and by the ensuing autumn they will have taken root, and may be cut from the parent plant and removed to the place for which they are designed. If propagated by cuttings, the cuttings should be planted in September, as soon as the ground is moistened by rain. They should have four joints, of which three are to be buried in the ground. If seeds be used, they should be sown in the autumn, soon after they are matured, as otherwise the plant will not spring up the first year. They thrive best in a sandy loam.

2. L. Caprifolium. Italian honeysuckle. Flowers ungent whaled, terminal, white, red, and yellow, and very fragrant. Found largely in Italy, but also in the woods of our own country. It may be propagated as the last.

3. L. Alpigena. Upright red-berried honeysuckle. Peduncles two-flowered; berries closely united, in pairs; leaves oval-lanceolate: stem four or five feet high; corols red, unequal. A native of the Alps, and propagated as the last.

4. L. Nigra. Black-berried upright honeysuckle. Peduncles two flowered; berries distinct; leaves elliptic, very entire. Stem about three feet high; flowers white, succeeded by black berries. A native of the South of Europe.

5. L. Xylosteum. Fly-honeysuckle. Peduncles two-flowered; berries distinct; leaves entire, downy: corols white. Stem shrubby, branching erect to the height of seven or eight feet. A native of Europe, and found frequently in our own coppices.

6. L. Symphoricarpos. Shrubby St. Peter's-wort. Heads of flowers lateral, peduncled; leaves petioled: small greenish flowers. A native of Virginia and Carolina.

7. L. Diervilla. Arcadian honey-suckle. Racemes terminal; leaves serrate: flowers small, pale yellow: appear in May or June, and continue till the autumn; but rarely ripen in our own country. A native of New York.

8. L. Periclimenum. Common climbing honeysuckle. Heads ovate, imbricate, terminal; leaves deciduous, all of them distinct; flowers ringent. Another variety with leaves sinuate, often variegated. Common to our own hedges.

9. L. Tartarica. Tartarian honeysuckle. Peduncles two-flowered; berries distinct; leaves heart-shaped, obtuse, glabrous: flowers white, erect. A native of Tartary.

10. L. cœrulea. Blue-berried honeysuckle. Peduncles two-flowered; berries closely united, globular; styles undivided; yellow bark and yellow flowers. A native of Switzerland. The modes of propagation pointed out under the first species will, with little variation, apply to all the rest.

LONICERUS (John), a learned German, born at Orthern. He was a protestant, and published a Greek and Latin Lexicon, and some other works. He died in 1569.

LONICERUS (Adam), son of the preceding, was bred a physician, and wrote several books on natural history, particularly a History of Plants, Animals, and Metals. He died at Frankfort in 1586.

LONSDALE. See KIRKBY LONSDALE.

LOO or LUE. (*luer*, Fr.) A game at cards called also LANTERLOO, which see.

LOO, a town of the United Provinces, in Guelderland, eight miles west of Deventer, where the prince of Orange had a fine palace. Lon. 6. 0 E. Lat. 52. 18 N.

LOOE, East and West, two mean boroughs in Cornwall, separated by a creek, over which is a narrow stone bridge. They send together as many members to parliament as London. The market held at East Looe is on Saturday. They are 16 miles W. of Plymouth, and 232 W. by S. of London. Lon. 4. 36 W. Lat. 50. 23 N.

LOO'BILY. *a.* (*looby* and *like.*) Awkward; clumsy (*L'Estrange*).

LO'OBY. *s.* (*llabe*, a clown, Welsh.) A lubber; a clumsy clown (*Swift*).

LO'OF. *s.* That part aloft of the ship which lies just before the chess-trees, as far as the bulkhead of the castle (*Sea Dictionary*).

*To* LOOF. *v. a.* To bring the ship close to a wind.

LO'OFED. *a.* (from *aloof.*) Gone to a distance (*Shakspeare*).

*To* LOOK. *v. n.* (locan, Saxon.) 1. To direct the eye to or from any object. 2. To have power of seeing (*Dryden*). 3. To direct the intellectual eye (*Stillingfleet*). 4. To expect (*Claren.*). 5. To take care; to watch (*Locke*). 6. To be directed with regard to any object (*Proverbs*). 7. To have any particular appearance; to seem (*Burnet*). 8. To have any air, mien, or manner (*Shak.*). 9. To form the air in any particular manner, in regarding or beholding (*Milton*). 10. *To* LOOK *about one.* To be alarmed; to be vigilant (*Har.*). 11. *To* LOOK *after.* To attend; to take care of (*Loc.*). 12. *To* LOOK *for.* To expect (*Sidney*). 13. *To* LOOK *into.* To examine; to sift; to inspect closely (*Atterbury*). 14. *To* LOOK *on.* To respect; to esteem; to regard as good or bad (*Dryden*). 15. *To* LOOK *on.* To consider; to conceive of; to think (*South*). 16. *To* LOOK *on.* To be a mere idle spectator (*Bacon*). 17. *To* LOOK *over.* To examine; to try one by one

(*Locke*). 18. *To* LOOK *out*. To search; to seek (*Sw*.). 19. *To* LOOK *out*. To be on the watch (*Coll*.). 20. *To* LOOK *to*. To watch; to take care of (*Shakspeare*). 21. *To* LOOK *to*. To behold.

*To* LOOK. *v. a.* 1. To seek; to search for (*Spenser*). 2. To turn the eye upon (*Kings*). 3. To influence by looks (*Dryden*). 4. *To* LOOK *out*. To discover by searching.

LOOK. *interj*. See! lo! behold! observe! (*Shakspeare*).

LOOK. *s.* 1. Air of the face; mien; cast of the countenance (*Shaks*.). 2. The act of looking or seeing (*Dryden*).

LO'OKER. *s.*(from *look*.) 1. One that looks. 2. LOOKER *on*. Spectator, not agent (*Add*.).

LO'OKING-GLASS. *s.* (*look* and *glass*.) Mirror; a glass which shews forms reflected (*Shakspeare*).

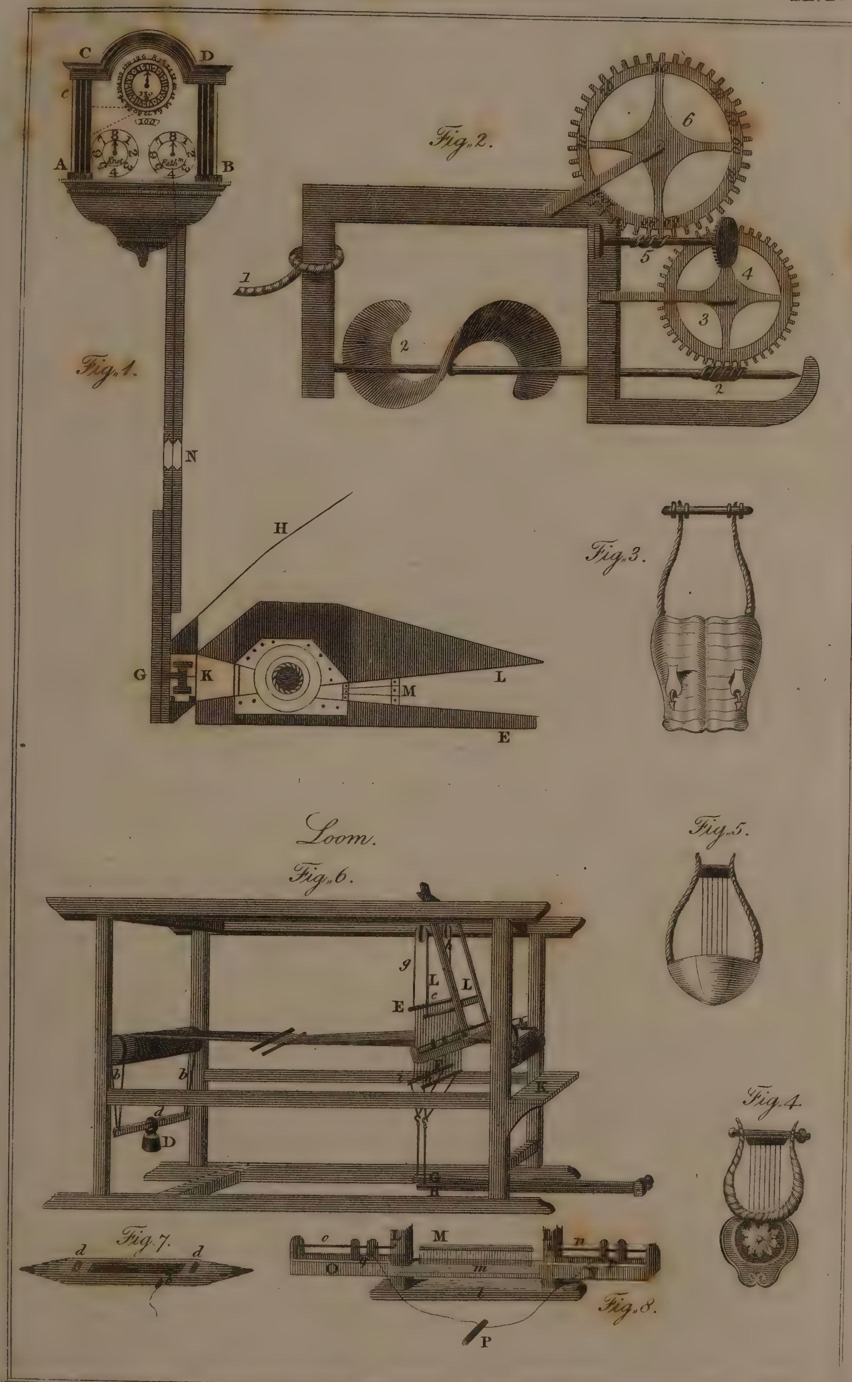
LOOKING-GLASS PLANT. See HERITEIRA.

LOOKING-GLASS, (Venus's) See CAMPANULA.

LOOL, in metallurgy, a vessel made to receive the washings of ores of metals. The heavier or more metalline parts of the ores remain in the trough in which they are washed; the lighter and more earthy run off with the water, but settle in the lool.

LOOM, the weaver's frame; a machine whereby several distinct threads are woven into one piece. Looms are of various structures, accommodated to the various kinds of materials to be woven, and the various manner of weaving them; viz. for woollens, silks, linens, cottons, cloths of gold; and other works, as tapestry, ribbands, stockings, &c. divers of which will be found under their proper heads. See WEAVING. The weaver's loom-engine, otherwise called the Dutch loom-engine, was brought into use from Holland to London, in or about the year 1676.

The lower compartment of pl. 100 represents a loom for weaving silks or other plain work. A, fig. 6, is a roll called the cloth-beam, on which the cloth is wound as it is wove; at one end it has a racket-wheel *a*, and a click to prevent its running back; at the same end it has also four holes in it, and is turned by putting a stick in these holes: at the other end of the loom is another roll B, on which the yarn is wound; this has two small cords *bb* wrapped round it, the ends of which are attached to a bar *d*, which has a weight D hung to it; by this means a friction is caused, which prevents the roll B turning by accident. EF are called lambs; they are composed of two sticks *efhi*, between which are fastened a great number of threads; to the bar *e* are fastened two cords *gh*, which pass over pulleys, and are fastened to the bar *h* of the lamb F; the lower bars of each lamb are connected by cords with the treadles GH; the workman sits on the seat K, and places his feet upon these treadles; as they are connected together by the cords *gh*, when he presses down one, it will raise the other, and the lambs with them; a great number of threads, according to the width of the cloth, are wound round the yarn-beam B, and are stretched to the cloth-beam A; the middle of the threads which compose the lamb EF, have loops (called eyes) in them, through which the threads between the rolls AB, which are called the warp, are passed; the first thread of the warp goes through the loops of the lambs E, the next attached to the lamb F, and so on alternately; by this means, when the weaver presses down one of the treadles with his foot, and raises the other, one lamb draws up every other thread, and the other sinks all the rest, so as to make an opening between the sets of thread: LL is a frame moving on a centre at the top of the frame of the loom; the lower part of this frame is shewn in fig. 8. LL are the two uprights of the frame, *l* is the bar that connects them, M is a frame carrying a great number of pieces of split reed or sometimes fine wire at equal distances; between these the threads of the warp are passed; the frame M is supported by a piece of wood *m* called the shuttle-race, which is fastened into the front of the pieces LL; each end of this piece has boards nailed to the sides, so as to form troughs NO; at a small distance above these are fixed two very smooth wires *no*; their use is to guide the two pieces *pq*, called peckers or drivers; to each of these pieces a string is fastened, and these strings are tied to a piece of wood P, which the weaver holds in his hand, and by snatching the stick to either side, draws the pecker forwards very quick, and gives the shuttle, fig. 7 (which is to be laid in the trough before the pecker) a smart blow, and drives it along across the race *m* into the other trough, where it pushes the pecker along to the end of the wire, ready for the next stroke which throws it back again, and so on. Fig. 7. represents the under side of the shuttle on a larger scale; its ends are pointed with iron; it has a large mortise through the middle of it, in which is placed a quill *a* containing the yarn; *b* is a piece of glass, called the eye of the shuttle, with a hole in it, through which comes the end of the thread; *dd* are two small wheels to make it run easily on the race. The operations are as follow: the workman sitting upon the seat K, holds the stick P in his right hand, and takes hold of one of the bars of the frame LL with his left: presses his foot on one of the treadles GH, which by means of the lambs EF, as before described, divides the warp; he then snatches the stick P, and by that means throws the shuttle, fig. 7, which unwinds the thread in it, and leaves it lying in between the threads of the warp; he then relieves the treadle he before kept down, and presses down the other; while he is doing this, he with his left hand draws the frame LL towards him, and then returns it. The use of this is to beat the last thread thrown by the shuttle close up to the one that was thrown before it by the split reeds M, fig. 8. As soon as he has brought the frame LL back to its original position, and again divided the warp by the treadle, he throws the shuttle again: when he has in this manner finished about 12 or 14 inches of cloth, he winds it up by turning the roll A with the stick, as before described. Some very expert weavers

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will throw the shuttle and perform the other operations at the rate of 120 times per minute. (*Gregory's Dictionary*.)

LOOM (Indian). The Indian loom consists merely of two bamboo-rollers, one for the warp, and the other for the web, and a pair of geer; the shuttle performs the double office of shuttle and batton, and for this purpose is made like a large netting needle, and of a length somewhat exceeding the breadth of the piece.

This apparatus the weaver carries to whatever tree affords a shade most grateful to him, under which he digs a hole large enough to contain his legs, and the lower part of the geer; he then stretches his warp by fastening his bamboo rollers at a due distance from each other on the turf by wooden pins; the balances of the geer he fastens to some convenient branch of the tree over his head; two loops underneath the geer, in which he inserts his great toes, serve instead of treadles; and his long shuttle, which performs also the office of a batton, draws the weft, throws the warp, and afterwards strikes it up close to the web: in such looms as this are made those admirable muslins whose delicate texture the European could never equal with all his complicated machinery.

LOOM, in the sea language. When a ship appears big when seen at a distance, they say she looms.

LOOM-GALE, a gentle easy gale of wind, in which a ship can carry her topsails atrip.

LOOM (Heir). See HEIRLOOM.

LOON. *s.* A lown; a sorry fellow; a scoundrel; a rascal (*Dryden*).

LOOP. *s.* (from *loopen*, Dutch.) A double through which a string or lace is drawn; an ornamental double or fringe (*Spenser*).

LOOP, in the iron works, denotes a part of a sow or block of cast iron, broken or melted off from the rest.

LO'OPED. *a.* (from *loop*.) Full of holes (*Shakspeare*).

LO'OPHOLE. *s.* (*loop* and *hole*.) 1. Aperture; hole to give a passage (*Milton*). 2. A shift; an evasion (*Dryden*).

LO'OPHOLED. *a.* (from *loophole*.) Full of holes; full of openings (*Hudibras*).

LOORD. *s.* (*loord*, Dutch.) A drone (*Spenser*).

*To* LOOSE. *v. a.* (leȝan, Saxon.) 1. To unbind; to untie any thing fastened. 2. To relax (*Daniel*). 3. To unbind any one bound (*Luke*). 4. To free from imprisonment (*Isa.*). 5. To free from any obligation (*Corinthians*). 6. To free from any thing that shackles the mind (*Dryden*). 7. To free from any thing painful (*Luke*). 8. To disengage (*Dryden*).

*To* LOOSE. *v. n.* To set sail; to depart by loosing the anchor (*Acts*).

LOOSE. *a.* (from the verb.) 1. Unbound; untied (*Shakspeare*). 2. Not fast; not fixed (*Bentley*). 3. Not tight: as, *a* loose *robe*. 4. Not crowded; not close (*Milton*). 5. Wanton; not chaste (*Spenser*). 6. Not close; not concise; lax (*Felton*). 7. Vague; indeterminate (*Arbuth.*). 8. Not strict; not rigid (*Hooker*). 9. Unconnected; rambling (*Watts*). 10. Lax of body; not costive (*Locke*). 11. Disengaged; not enslaved (*Atterbury*). 12. Disengaged from obligation (*Addison*). 13. Free from confinement (*Prior*). 14. Remiss; not attentive. 15. *To break* LOOSE. To gain liberty (*Locke*). 16. *To let* LOOSE. To set at liberty; to set at large; to free from any restraint (*Taylor*).

LOOSE. *s.* (from the verb.) 1. Liberty; freedom from restraint (*Prior*). 2. Dismission from any restraining force (*Bacon*).

LOOSE-JOINTED, in the manage, a term applied to horses whose pasterns are so long as to let the hoof come considerably from under the perpendicular position of the fore leg, so that the heel is exceedingly flat, and the hinder part of the fetlock joint, by a kind of elastic bend or drop, seems nearly to touch the ground. Horses of the blood kind have frequently this defect; many of which have at the same time the additional defect of a long back, and consequently great weakness of the loins; these in the aggregate constitute a completely loose-jointed horse.

LOOSE-STRIFE, in botany. See ANAGALLIS, LYTHRUM, GAWA, &c.

LO'OSELY. *ad.* (from *loose*.) 1. Not fast; not firmly (*Dry.*). 2. Without bandage (*Sp.*). 3. Without union or connexion (*Norris*). 4. Irregularity (*Camden*). 5. Negligently; carelessly (*Hooker*). 6. Unsolidly; meanly; without dignity (*Sh.*). 7. Unchastely (*Pope*).

*To* LO'OSEN. *v. n.* (from *loose*.) To part; to tend to separation (*Sharp*).

*To* LO'OSEN. *v. a.* (from *loose*.) 1. To relax any thing tied. 2. To make less coherent (*Ba.*). 3. To separate a compages (*Milton*). 4. To free from restraint (*Dryden*). 5. To make not costive (*Bacon*).

LO'OSENESS. *s.* (from *loose*.) 1. State contrary to that of being fast or fixed (*Ba.*). 2. Latitude; criminal levity (*Atterb.*). 3. Irregularity; neglect of laws (*Hayward*). 4. Lewdness; unchastity (*Spenser*). 5. Diarrhœa; flux of the belly (*Arbuthnot*).

*To* LOP. *v. a.* (from *laube*, Germ. a leaf.) 1. To cut the branches of trees (*Shak.*). 2. To cut any thing (*Howel*).

LOP. *s.* (from the verb.) 1. That which is cut from trees (*Mortimer*). 2. (*loppa*, Swed.) A flea.

LOPE. The old pret. of *leap* (*Spenser*).

LOPE'RIA, in botany, a genus of the class monandria, order monogynia. Calyx four-leaved, corol five-petalled, unequal; capsule four-celled, four-valved, many-seeded: one species; an herbaceous plant of Mexico, with racemed flowers.

LOPEZ LE VEGA. See VEGA.

LOPEZ RADIX. Lopez root. Radix lopeziana. Radix indica lopeziana. The root of an unknown tree, growing, according to some, at Goa. It is met with in pieces of different thickness, some at least of two inches diameter. The woody part is whitish, and very light; softer, more spongy, and whiter next the bark, including a denser, somewhat reddish, medullary part. The bark is rough, wrinkled, brown, soft, and, as it were, woolly, pretty thick, co-

vered with a thin paler cuticle. Neither the woody nor cortical part has any remarkable smell or taste, nor any appearance of resinous matter. It appears that this medicine has been remarkably effectual in stopping colliquative diarrhœas which had resisted the usual remedies. Those attending the last stage of consumptions were particularly relieved by its use. It seemed to act, not by an astringent power, but by a faculty of restraining and appeasing spasmodic and inordinate motions of the intestines. Dr. Gaubius, who gives this account, compares its action to that of fimarouba, but thinks it more efficacious than this medicine.

LOPHIUS, in zoology, a genus of the class pisces, order branchi or tegons. Head compressed, downwards; teeth sharp, numerous; tongue broad, armed with teeth; eyes vertical, nostrils small; gills three, the aperture lateral, simple; pectoral fins broad, thick, and more or less resembling feet; dorsal and anal opposite and near the tail; body naked, covered with a thin loose skin; vent in the middle of the body; without lateral line. Eight species: scattered principally through the Northern, South American, and Australasian seas: one found on our own coasts. The following are chiefly entitled to notice:

1. L. piscatorius. Fishing-frog; Angler; Frog-fish. Body depressed; head rounded, much larger than the body: iris radiate with white and brown; before the eyes a horny bristle; teeth long, rounded, bent inwards, those in the upper jaw in three rows, those in the lower jaw, which is longer, rounded, in a double row, the hind ones very large and moveable inwards; tongue broad, thick, short; palate and bones of the throat toothed; ventral fins short, rigid, palmate, white; tail black, the other fins brown; pectoral white beneath, edged with black. Inhabits most European seas; grows to seven feet long; lurks behind sand-hills or heaps of stones, and throwing over the slender appendages on its head resembling worms entices little fishes to play round them, till they come within its reach, when they are instantly devoured: is very sluggish, and swims with great difficulty.

2. L. monopterigius. Body depressed; blackish, beneath whitish: fin above the tail suberect, ramous. Inhabits the seas of Australasia. This very singular fish Dr. Shaw is doubtful where to place. It has no fin except the lobate one just above the tail: the eyes are vertical, approximate and far behind the snout; the body roundish, a little tapering to both ends, and the tail or lobe at the end of the body rounded.

LO'PPER. *s.* (from *lop.*) One that cuts trees.

LO'PPERED. *a.* Coagulated: as, *loppered* milk (*Ainsworth*).

LOQUA'CIOUS. *a.* (*loquax*, Latin.) 1. Full of talk; full of tongue (*Milton*). 2. Speaking (*Philips*). 3. Blabbing; not secret.

LOQUA'CITY. *s.* (*loquacitas*, Lat.) Too much talk (*Ray*).

LORA'NTHUS, in botany, a genus of the class hexandria, order monogynia. Germ inferior; calyxless; corol six-cleft, revolute; stamens placed on the tips of the petals; berry one-seeded. Twenty-seven species: natives of the East or West Indies, or South America; chiefly shrubs or shrubby.

LORD. *s.* (hlaford, Saxon.) 1. Monarch; ruler; governour (*Milton*). 2. Master; supreme person (*Shakspeare*). 3. A tyrant; an oppressive ruler (*Hayward*). 4. A husband (*Pope*). 5. One who is at the head of any business; an overseer (*Tusser*). 6. A nobleman (*Shaksp*). 7. A general name for a peer of England. 8. A baron. 9. An honorary title applied to officers: as, lord *chief justice*, lord *mayor*.

*To* LORD. *v. n.* To domineer; to rule despotically (*Spenser. Philips*).

LORD, a title of honour given to those who are noble either by birth or creation. In this sense, it amounts to much the same as *peer of the realm*, or *lord of parliament*. The title is by courtesy also given to all the sons of dukes and marquises, and to the eldest sons of earls: and it is also a title of honour bestowed on those who are honourable by their employments; as, *lord advocate*, *lord chamberlain*, *lord chancellor*, *&c.* The word is Saxon, but abbreviated from two syllables into one: for it was originally *Illaford*, which by dropping the aspiration became *Laford*, and afterwards by contraction *Lord*. "The etymology of the word (says J. Coates) is well worth observing; for it was composed of *illaf*, a loaf of bread, and *ford*, to give or afford; so that *Illaford*, now *Lord*, implies a giver of bread, because, in those ages, such great men kept extraordinary houses, and fed all the poor; for which reason they were called *givers of bread*, a thing now much out of date, great men being fond of retaining the title, but few regarding the practice for which it was first given." See LADY.

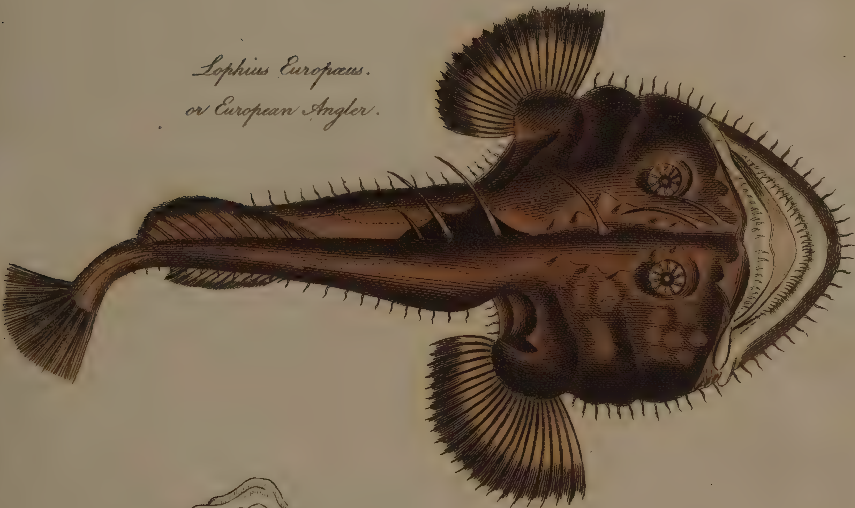
LORDS (House of), one of the three estates of parliament, and composed of the lords spiritual and temporal.

1. The spiritual lords consist of two archbishops and 24 bishops; and at the dissolution of monasteries by Henry VIII. consisted likewise of 26 mitred abbots and two priors: a very considerable body, and in those times equal in number to the temporal nobility. All these hold, or are supposed to hold, cert in ancient baronies under the king: for William the Conqueror thought proper to change the spiritual tenure of frank-almoign or free-alms, under which the bishops held their lands during the Saxon government, into the feodal or Norman tenure by barony; which subjected their estates to all civil charges and assessments, from which they were before exempt; and in right of succession to those baronies, which were unalienable from their respective dignities, the bishops and abbots were allowed their seats in the house of lords. But though these lords spiritual are in the eye of the law a distinct estate from the lords temporal, and are so distinguished in most of our acts of parliament; yet in practice they are usually blended together under the name of the lords; they intermix in their votes, and the majority of such intermixture joins both estates. And from this

*Lophius.*

*Lophius Pictus, or Painted Angler.*

*Lophius Europæus. or European Angler.*



*Loricaria Flava. or Yellow Loricaria.*

London, Published by Sherwood & Co. Paternoster Row, Aug. 1. 1811.

want of a separate assembly, and separate negative of the prelates, some writers have argued very cogently, that the lords spiritual and temporal are now in reality only one estate: which is unquestionably true in every effectual sense, though the ancient distinction between them still nominally continues. For if a bill should pass their house, there is no doubt of its validity, though every lord spiritual should vote against it; of which Selden and sir Edward Coke give many instances: as, on the other hand, doubtless it would be equally good, if the lords temporal present were inferior to the bishops in number, and every one of those temporal lords gave his vote to reject the bill; though this sir Edward Coke seems to doubt of.

2. The temporal lords consist of all the peers of the realm (the bishops not being in strictness held to be such, but merely lords of parliament), by whatever title of nobility distinguished; dukes, marquises, earls, viscounts, or barons. Some of these sit by descent, as do all ancient peers; some by creation, as do all new made ones; others, since the union with Scotland, by election, which is the case of the 16 peers, who represent the body of the Scots nobility. Their number is indefinite, and may be increased at will by the power of the crown; and once, in the reign of queen Anne, there was an instance of creating no less than twelve together; in contemplation of which, in the reign of king George I. a bill passed the house of lords, and was countenanced by the then ministry, for limiting the number of the peerage. This was thought by some to promise a great acquisition to the constitution, by restraining the prerogative from gaining the ascendant in that august assembly by pouring in at pleasure an unlimited number of new-created lords. But the bill was ill relished, and miscarried in the house of commons, whose leading members were then desirous to keep the avenues to the other house as open and easy as possible.

The distinction of ranks and honours is necessary in every well-governed state: in order to reward such as are eminent for their services to the public, in a manner the most desirable to individuals, and yet without burthen to the community; exciting thereby an ambitious yet laudable ardour and generous emulation in others. And emulation, or virtuous ambition, is a spring of action which, however dangerous or invidious in a mere republic or under a despotic sway, will certainly be attended with good effects under a free monarchy; where, without destroying its existence, its excesses may be continually restrained by that superior power from which all honour is derived. Such a spirit, when nationally diffused, gives life and vigour to the community; it sets all the wheels of government in motion, which, under a wise regulator, may be directed to any beneficial purpose; and thereby every individual may be made subservient to the public good, while he principally means to promote his own particular views. A body of nobility is also more particularly necessary in our mixed and compounded constitution, in order to support the rights of both the crown and the people, by forming a barrier to withstand the encroachments of both. It creates and preserves that gradual scale of dignity which proceeds from the peasant to the prince; rising like a pyramid from a broad foundation, and diminishing to a point as it rises. It is this ascending and contracting proportion that adds stability to any government; for, when the departure is sudden from one extreme to another, we may pronounce that state to be precarious. The nobility therefore are the pillars, which are reared from among the people, more immediately to support the throne; and, if that falls, they must also be buried under its ruins. Accordingly, when in the last century the commons had determined to extirpate monarchy, they also voted the house of lords to be useless and dangerous. And since titles of nobility are thus expedient in the state, it is also expedient that their owners should form an independent and separate branch of the legislature. If they were confounded with the mass of the people, and like them had only a vote in electing representatives, their privileges would soon be borne down and overwhelmed by the popular torrent, which would effectually level all distinctions. It is therefore highly necessary that the body of nobles should have a distinct assembly, distinct deliberations, and distinct powers from the commons. See also KING, NOBILITY, PARLIAMENT, COMMONS, and COMMONALTY.

LORDS AND LADIES, in botany. See ARUM.

LORD HOWE'S GROUP, an extensive group of islands in the South Pacific Ocean, discovered, in 1791, by captain Hunter, who distinctly descried 32 of them, some of considerable extent. They appeared thickly covered with wood, among which the cocoa-nut was very distinguishable. Nine of the natives came near the ship in a canoe, which was about forty feet long, badly made, and had an outrigger. They were a stout, clean, well-made people, of a dark copper colour; their hair tied in a knot on the back of the head; and they appeared as if clean-shaved. They had an ornament, consisting of a number of fringes, like an artificial beard, which was fastened close under the nose; and to this beard hung a row of teeth, which gave them the appearance of having a mouth lower than their natural one. They had holes run through the sides of their nose into the passage, into which, as well as through the septum, were thrust pieces of reed or bone. The arms and thighs were tattowed, and some were painted with red and white streaks. They wore a wrapper round their middle. Lon. from 159. 14 to 159. 37 E. Lat. 5. 30 S.

LORD HOWE'S ISLAND, an island of the South Pacific Ocean, discovered in 1788 by lieutenant King, in his voyage from Port Jackson to Norfolk Island. Many excellent turtle have been caught here on a sandy beach; and it abounds with a variety of birds, which were

so unaccustomed to be disturbed, that the seamen went near enough to knock down as many as they wanted with a stick. At its S. end are two high mountains, nearly perpendicular from the sea; the southernmost named Mount Gower. About 14 miles to the south is a remarkable rock, named Ball's Pyramid, which had much the appearance of a steeple at a distance. The island is three miles and a half long, and very narrow. Lon. 159. 0 E. Lat. 31. 36 N.

LO'RDING. *s.* (from *lord.*) A little lord; a lord in contempt or ridicule (*Shakspeare*).

LO'RDLING. *s.* A diminutive lord (*Sw.*).

LO'RDLINESS. *s.* (from *lordly.*) 1. Dignity; high station (*Shakspeare*). 2. Pride; haughtiness.

LO'RDLY. *a.* (from *lord.*) 1. Befitting a lord (*South*). 2. Proud; haughty; imperious; insolent (*Shakspeare*).

Lo'rdly. *ad.* Imperiously; despotically; proudly (*Dryden*).

LO'RDSHIP. *s.* (from *lord.*) 1. Dominion; power (*Sidney*). 2. Seigniory; domain (*Dryden*). 3. Title of honour used to a nobleman not a duke (*Ben Jonson*). 4. Titulary compellation of judges, and some other persons in authority and office.

LORE. *s.* (from læꞃan, Saxon, to learn.) Lesson; doctrine; instruction (*Milton. Pope*).

Lore. *a.* (leoꞃan, Saxon.) Lost; destroyed.

Lore, in ornithology, a naked line between the base of the bill and the eye, in birds.

LO'REL. *s.* (from leoꞃan, Saxon.) An abandoned scoundrel: obsolete (*Spenser*).

LOREDO, a town of Italy, in Polesino di Rovigo, seated on the Adige, 20 miles E. of Rovigo. Lon. 12. 50 E. Lat. 45. 5 N.

LORETTO, a fortified town of Italy, in the marquisate of Ancona, with a bishop's see. It contains the Casa Santa, or House of Nazareth, in which it is pretended Jesus Christ was brought up. According to the legend, it was carried by angels into Dalmatia, and thence to the place where it now stands. The inner part of this house or chapel is very old; but it is surrounded by a marble wall, and within is a church built of freestone. The famous lady of Loretto, who holds the infant Jesus in her arms, stands upon the principal altar: this statue is of cedar wood, three feet high, but her face can hardly be seen, on account of the numerous lamps around her. She is clothed with cloth of gold, set off with jewels, and the little Jesus is covered with a shirt. He holds a globe in his hand, and is adorned with rich jewels. There are prodigious numbers frequently go in pilgrimage to Loretto; and every pilgrim, after having performed his devotion, makes the Virgin a present proportionable to its ability; whence it may be concluded, that this chapel is immensely rich. Christina, queen of Sweden, made the Virgin a present of a crown of gold, worth 100,000 crowns; and Isabella, infanta of Spain, sent her a garment which cost 40,000 ducats. Lewis XIII. of France, and his queen, sent her two crowns of gold, enriched with diamonds, and an angel of massy silver, holding in his hand the figure of the dauphin, of solid gold. The town itself, exclusive of the chapel, is neither considerable nor agreeable; nor does it contain above 300 inhabitants, who are almost all shoe-makers, tailors, or sellers of chaplets. It is seated on a mountain, three miles from the gulf of Venice, 12 S.E. of Ancona, and 112 N.E. of Rome. Lon. 13. 38 E. Lat. 43. 27 H.

LORGUES, a populous town of France, in the department of Var, seated on the Argens, five miles W. by S. of Draguignan, and 360 S. by E. of Paris. Lon. 6. 27 E. Lat. 43. 30 N.

LORICA, was a cuirass, brigantine, or coat of mail, in use among the Roman soldiers. It was generally made of leather, and is supposed to be derived from *lorum.*—The loricæ were set with plates of metal in various forms; sometimes in hooks or rings like a chain, sometimes like feathers, and sometimes like the scales of serpents or fishes, to which plates of gold were often added. There were other lighter cuirasses consisting only of many folds of linen cloth, or of flax made strong enough to resist weapons. Such soldiers as were rated under 1000 drachms, instead of the lorica now described, wore a *pectorale.*—The Roman lorica was made like a shirt, and defended the wearer both before and behind, but was so contrived that the back part could be occasionally separated from the front.

LORICARIA. In zoology, a genus of the class pisces, order abdominalia. Head smooth, depressed; mouth without teeth, retractile; gill membrane six-rayed; body mailed. Two species: one with a single dorsal fin, L. cataphracta: the other with two dorsal fins, L. plecostomus: both inhabit South America.

LORICATE, in botany, covered with a kind of mail.

*To* Loricate. *v. a.* To plate over.

LO'RIMER. Lo'riner. *s.* (*lormier*, Fr.) Bridle-cutter.

LORIS, in mastiology. See Lemur.

LORIMERS, one of the companies of London, that make bits for bridles, spurs, and such-like small iron ware. They are mentioned in statute 1 Rich. II. c. 12.—The word seems derived from the Latin word *lorum*, a thong.

LORME (Philibert de), one of the most celebrated architects in the 16th century, was born at Lyons. Queen Catherine de Medicis gave him the superintendance of buildings; and he had the direction of those of the Louvre, the Thuilleries, the castle of St. Anet, St. Germains, and other edifices erected by her orders. He wrote several books of architecture, which are esteemed; and died about the year 1577.

LORN. pret. pass. (of loꞃnan, Sax.) Forsaken; lost (*Spenser*).

LORNE, a district in the north part of Argyleshire, between Loch Etive and Loch Awe.

LORRAIN, a late province of France, bounded on the north by Luxemburgh and

Treves, on the east by Alsace and Deux Ponts, on the south by Franche Comté, and on the west by Champagne and Bar. It is 100 miles in length and 75 in breadth, and abounds in all sorts of corn, wine, hemp, flax, and rape-seed. There are fine meadows and large forests, with mines of iron, silver, and copper, and salt pits. The principal rivers are the Maese or Meuse, the Moselle, the Seille, the Meurthe and the Sare. This province now forms the three departments of Meurthe, Moselle, and the Vosges.

LORRAINE (Claude of). See CLAUDE.

LORY, in ornithology. See PICA.

*To* LOSE. *v. a.* pret. and part. *lost.* (leoꞃan, Saxon.) 1. To forfeit by unsuccessful contest (*Dryden*). 2. To forfeit as a penalty (*Pope*). 3. To be deprived of (*Knolles*). 4. To suffer diminution of (*Matthew.*) 5. To possess no longer (*Addison*). 6. To miss, so as not to find (*Swift*). 7. To separate or alienate (*Swift*). 8. To ruin; to send to perdition (*Addison*). 9. To bewilder, so as that the way is no longer known (*K. Charles*). 10. To deprive of (*Temple*). 11. Not to employ; not to enjoy (*Dryden*). 12. To squander; to throw away (*Pope*). 13. To suffer to vanish from view (*Pope*). 14. To destroy by shipwreck (*Prior*). 15. To employ ineffectually (*Pope*). 16. To miss; to part with, so as not to recover (*Clarendon*). 17. To be freed from (*Parnel*).

*To* LOSE. *v. n.* 1. Not to win (*Shakspeare*). 2. To decline; to fail (*Milton*).

LO'SEABLE. *a.* (from *lose.*) Subject to privation (*Boyle*).

LO'SEL. *s.* (from loꞃtan, to perish.) A scoundrel; a sorry worthless fellow: obsolete (*Spenser*).

LO'SER. *s.* (from *lose.*) One that is deprived of any thing; one that forfeits any thing: the contrary to *winner* or *gainer* (*Taylor*).

LOSS. *s.* (from *lose.*) 1. Detriment: the contrary to *gain* (*Hooker*). 2. Miss; privation (*Shakspeare*). 3. Deprivation; forfeiture (*Milton*). 4. Destruction (*Dryden*). 5. Fault; puzzle (*South*). 6. Useless application (*Addison*).

LOST. *participial a.* (from *lose.*) No longer perceptible (*Pope*).

LOT. *s.* (hloꞇ, Saxon.) 1. Fortune; state assigned (*Pope*). 2. A die, or any thing used in determining chances (*Dryden*). 3. A lucky or wished chance (*Shakspeare*). 4. A portion; a parcel of goods as being drawn by lot. 5. Proportion of taxes: as, *to pay scot and* lot.

LOT, the son of Haran, and nephew of Abraham, whom he accompanied to the land of Canaan. He afterwards left his uncle and settled at Sodom, where he was taken prisoner by Chederlaomer king of Edom, after defeating the king of Sodom and his allies. When Abraham heard this he armed his servants and pursued the Edomites, whom he vanquished, and rescued Lot with all his property. When Sodom was about to be destroyed for its iniquity, two angels came to Lot and forced him to quit the place, with his wife and two daughters, the former of whom, for looking back, was converted into a pillar of salt. He then retired to a cavern, where his daughters, thinking the race of men destroyed, made him drunk, and then lay with him. The fruits of this incestuous intercourse were Moab and Ammon.

LOT, a river of France, which rises in the department of Lozere, and watering Mende and Cahors, enters the Garonne, below Agen. It begins to be navigable at Cahors.

LOT, a department of France, including the late province of Querci. It takes its name from the river Lot. Cathors is the capital.

LOT AND GARONNE, a department of France, including part of the late province of Guienne. It is so called from two rivers. Agen is the capital.

LOTE-TREE, or nettle-tree. See CELTIS.

LOTE-TREE, of the ancients. See ZIZYPHUS.

LOTEN (John), a good landscape painter of the English school; though a native of Switzerland. His taste led him to solemn and dreary scenes, as land storms accompanied with showers of rain, &c. and he seldom omitted to introduce oak-trees in his prospects. His landscapes are generally large; and he painted with nature, truth, and force. But the effect of his composition had been much greater, if he had been less cold in his colouring: for the judicious eye is not pleased with the darkish tint that predominates in it. He died in London about 1681.

LOTHAIRE I. emperor of Germany, was the son of Louis le Debonnaire, and associated with him in the empire in 817, and named king of the Lombards in 820. He afterwards dethroned his father, and shut him up in a monastery. His two brothers, Louis and Charles, joined their forces against him, and obtained a great but bloody victory at Fontenai in 841. Two years afterwards a treaty was concluded between the three at Verdun, by which Lothaire obtained the empire, Italy, and some of the provinces between the Rhine and the Rhone; Louis had a tract of country bordering on the Rhine; and Charles became king of France. Ten years after this Lothaire voluntarily abdicated the crown, and died in a monastery in 855.

LOTHAIRE II. emperor of the West, and duke of Saxony, was the son of Gerhard count of Supplemburg, elected king of Germany, after the death of Henry V. in 1125, and crowned at Rome in 1133. He died in 1137.

LOTHAIRE, king of France, was the son of Louis IV. whom he succeeded in 954, at the age of 13 years. He made war against the emperor Otho II. with success, and died in 986, as it is said of poison administered by his wife Emma.

LOTHIAN, a name given to three counties of Scotland, viz. Haddingtonshire, Edinburghshire, and Linlithgowshire; otherwise called East, Mid, and West, Lothians. See EDINBURGHSHIRE.

LOTION, in medicine and pharmacy, is

such washing as concerns beautifying the skin, by cleansing it of those deformities which a distempered blood sometimes throws upon it, or rather are made by a preternatural secretion. There is reason to believe, that almost all the lotions advertised for sale as quack medicines contain much deleterious matter, such as muriated mercury, and therefore ought never to be had recourse to.

LOTTERY, a game of hazard, in which small sums are adventured for the chance of obtaining a larger value, either in money or other articles. Lotteries are formed on various plans; but in general they consist of a certain number of tickets, which are drawn at the same time, with a corresponding number of blanks and prizes mixed together, and by which the fate of the tickets is determined. This species of gaming has been sanctioned by the governments of France, Holland, Great Britain, and other countries, as a means of raising money for public purposes; as from the contributions being voluntary, it is always easier to obtain money in this way than by new taxes: it is, however, liable to the serious objection, that it tempts many persons to lose more than they can conveniently spare, particularly among the lower classes of society, who are led to neglect the gains of honest industry for the chance of acquiring sudden riches by a prize in the lottery.

The proposals for the first public lottery in England were published in 1567 and 1568, and it was drawn in 1569, at the west door of St. Paul's cathedral. The tickets were sold at ten shillings each, and there were no blanks. The prizes consisted chiefly of plate; and the profits of it were intended for the repair of the havens of the kingdom and other public works. In 1612 king James granted permission for a lottery, to be held at the west end of St. Paul's, of which the highest prize was of the value of 4000 crowns, in plate: this was for the assistance of the Virginia company, who were licensed to open lotteries in any part of England, by which means they raised 29,000*l.* At length these lotteries came to be considered a public evil; they attracted the attention of parliament, were represented by the commons as a grievance, and in 1620 were suspended by an order of council. In 1630, however, Charles I. granted a special license for a lottery, or lotteries, "according to the course of other lotteries heretofore used or practised," for defraying the expenses of a project for conveying water to London.

Soon after the revolution, lotteries were resorted to among other expedients for raising part of the extraordinaay sums necessary for the public service, by which the disposition for this species of gambling was greatly encouraged and extended; and private lotteries, formed on the most delusive and fraudulent principles, became so general, not only in London, but in all the other principal towns of England, that parliament found it necessary, in 1698, to pass an act for suppressing them; by which a penalty of 500*l.* was laid on the proprietors of any such lotteries, and of 20*l.* for every adventurer in them; notwithstanding which, the disposition to fraud on the one hand, and for adventure on the other, continued to prevail, and small lotteries were carried on under the denomination of sales of gloves, fans, cards, plate, and other articles. This was attempted to be checked by a clause of an act passed in 1712, which only gave rise to a new mode of carrying on this kind of gaming. The adventure was now made to depend on the drawing of the government lottery; and the selling and buying of chances and parts of chances of tickets in the state lotteries became a general practice, till it was prohibited by an act passed in 1718, by which all undertakings resembling lotteries, or being dependent on the state lottery, were strictly prohibited, under the penalty of 100l. over and above all penalties enjoined by former acts of parliament against private lotteries.

During the reign of queen Anne, the lotteries were generally for terminable annuities, to which both blanks and prizes were entitled, at different rates: thus, in 1710, the lottery consisted of 150,000 tickets, valued at 10*l.* each; every ticket being entitled to an annuity for thirty-two years, the blanks at 14*s.* per annum, and the prizes to greater annuities, from 5*l.* to 1000*l.* per annum. This was the first lottery for which the Bank of England received the subscriptions for government. In the following year, the whole of the money advanced for the tickets was to be repaid, both in blanks and prizes, in thirty-two years, with interest at 6 per cent. and an additional sum of nearly half a million to be divided in order to form the prizes; which additional capital was to be paid, with the like interest, within the same period as the original sum. In this manner, which was continued in several of the subsequent years, a very considerable premium was given for the money advanced, in addition to a high rate of interest.

According to the lottery plans which prevailed from sir Robert Walpole's administration to that of the duke of Grafton, the tickets were issued at 10*l.* each; and occasionally the subscription was open to the public at large. The highest prize was generally 10,000*l.* and the lowest 20*l.* There were from four to six blanks to one prize, and the blanks entitled the bearers to five or six pounds stock in 3 or 4 per cent. Bank annuities, the value of the blanks and prizes being generally funded. The office-keepers divided the tickets into shares and chances; the former entitling the holders to the proportion they had purchased of blanks and prizes; the chances to prizes only; that is, they had no return if the ticket was drawn a blank. The tickets, according to the advantage or disadvantage of the scheme, in respect to the number of blanks to a prize, and the number of high prizes, generally sold at from 11*l.* to 12*l.* before the drawing. When the ticket sold for 11*l.* and the blank was entitled to 6*l.* in the 3 per cent annuities, as the blank might be sold for 5*l.* 8*s.* ready money, when the 3 per cents. were at 90, the adventurer

only gambled at the risk of 5*l.* 12*s.*; and at the highest calculation, when tickets were worth 13*l.* he never staked more than 7*l.* 12*s.* for a ticket before the drawing.

In 1759, the scheme of the lottery included two prizes of 20,000*l.* each, which had not been the case in any lottery since the reign of queen Anne. The scheme for the year 1767 contained one prize of 20,000*l.* and this was for many years after the usual amount of the highest prize. About this time a material alteration was made in the plan of the lotteries; the allowance to blanks was discontinued, the whole sum being divided into prizes, the number of which was of course considerably increased, particularly as the proportion of small prizes was much greater than it has since been, and in several of the following years was less than two blanks to a prize. All the lotteries during the time lord North was chancellor of the exchequer were formed on this principle, with some variations in the schemes, which favoured the holders of tickets and the lottery-office keepers, and greatly expanded the spirit of gaming: such as paying the prizes in money intead of stock, and making the first-drawn ticket for several successive days a capital prize of 1000*l.* or more, which enhanced the price of tickets, and encouraged persons who had blanks drawn to buy in again. Some judicious regulations were, however, adopted for the security of persons purchasing shares of tickets, by confining the shares into which tickets may be divided to halves, quarters, eighths, and sixteenths, and obliging all lottery-office keepers to deposit the tickets they divide into shares in the Bank, and to have the said shares examined and stamped. The practice of insuring tickets and shares was likewise restrained by enacting, that "No person shall sell the chance or chances of any ticket, or any share, for any time less than the whole time of drawing from the day of sale; nor shall receive any sum of money whatsoever, in consideration for the repayment of any sum, in case any ticket shall prove fortunate, or in any case of any chance or event relating to the drawing, either as to time, or its being fortunate; nor shall publish proposals for the same; under the penalty of 500*l.* one half to be paid to the person suing for the same, and the other moiety to his majesty."

During Mr. Pitt's administration the lotteries were contracted for entirely distinct from the loans of the respective years; and as it became necessary to endeavour to augment every source of revenue as much as possible, various alterations were made in the lottery schemes, chiefly with the view of raising the price of tickets, and of keeping up the price during the time of drawing. The number and amount of the highest prizes were increased, some of the schemes containing four prizes of 20,000*l.* and others two of 30,000*l.*; while for the purpose of disposing of a greater number of tickets in the course of the year, the lottery was divided into two or three smaller ones, drawn at different times. The amount of the principal prizes was still further augmented; the lottery drawn in October, 1807, containing a prize of 40,000*l.* and that drawn in June, 1808, six prizes of 20,000*l.*

Notwithstanding the temptations which these schemes held out to the inconsiderate, the contractors found, either from the greater frequency of lotteries, or the increased number of tickets, that it became impossible to get the tickets off their hands, without resorting to a variety of expedients for attracting the public attention, which were carried so far as to become a public nuisance and disgrace. In 1808, a committee of the House of Commons was appointed, to inquire how far the evils attending lotteries have been remedied by the laws passed respecting the same; who in their report were of opinion, That (in case it shall be thought expedient to continue state lotteries) the number thereof in each year should be limited to two lotteries, of not more than 30,000 tickets each; that the number of days allowed for drawing, instead of ten, should be brought back to eight for each lottery, the number fixed in 1802; that the number of tickets to be drawn each day should be uncertain, and left to the discretion of the commissioners of stamp duties, and kept secret till the close of the drawing each day, care being taken, as the lottery proceeds, not to leave too great a number undrawn on the latter days of drawing, but that one moiety or upwards be drawn on the four first days thereof; that every lottery-office keeper should, in addition to his own licence, take out a limited number of licences for his agents; and that the limitation of hours during which lottery-offices may be open for the transaction of business, viz. from eight o'clock in the morning till eight o'clock in the evening, enacted by 22 Geo. III. c. 47, and renewed in the lottery acts of 1802, and the three following years, but omitted in those of 1806 and 1807, ought in future to be re-enacted, without the exception therein made to Saturday evenings. (*British Encyclopædia*)

LOTTERY (so called from the chances that attend it), a game at cards played by a large company with two complete packs of cards, one for the prizes, the other for the tickets, and dealt by any two of the party that may chuse, for the deal is neither advantageous nor otherwise. Each player pools a fixed sum, or takes a certain number of counters, on which a settled value is put, andwhich are placed in a box or pool as a fund for the lottery; then after the cards have been shuffled, and are cut by the left-hand neighbour, one dealer gives to every player a card, faced downwards, for the lots or prizes, on which are to be placed different numbers of counters from the pool, at the option of the person to whom such card has been given; afterwards the second dealer distributes from the other pack a card to each player, for the tickets; next the lots are turned by one of the managers, and whosoever possesses a corresponding card receives the stake placed thereon, and those remaining undrawn are added to the fund in the pool; the dealers then collect

the cards and proceed as before, till the fund is exhausted, when the party pool again, and those who have gained more counters than they want receive the difference in money.

Another method is, to take at random three cards out of one of the packs, and place them face downwards, on a board or in a bowl on the table for the prizes; then every player purchases from the other pack any number of cards for tickets as may be most agreeable, paying a fixed sum or certain quantity of counters for each, which sums or counters are put in different proportions on the three prizes to be gained by those who happen to have purchased corresponding cards, and such that happen not to be drawn are continued till thenext deal.

This game may be played with a single pack, by separating the same into two divisions, each containing a red and black suit.

Lotteries are declared to be public nuisances, 5. Geo. I. c. 9.; but for the public service of the government, lotteries are frequently established by particular statutes and managed by special officers and persons appointed.

By statute 42 Geo. III. c. 54, lottery-office keepers are to pay fifty pounds for every licence in London, Edinburgh, and Dublin, or within twenty miles of either, and ten pounds for every licence for every other office; and licensed persons shall deposit thirty tickets with the receiver-general of the stamp duties, or licence to be void.

By statute 22 Geo. III. c. 47, lottery-office keepers must take out a licence, and offices are to be open only from eight in the morning to eight in the evening, except the Saturday evening preceding the drawing. The sale of chances and shares of tickets, by persons not being proprietors thereof, are prohibited under penalty of fifty pounds, and, by 42 Geo. III. c. 119, all games or lotteries, called little goes, are declared public nuisances, and all persons keeping any office or place for any game or lottery, not authorized by law, shall forfeit five hundred pounds, and be deemed rogues and vagabonds. The proprietor of a whole ticket may nevertheless insure it for its value only, with any licensed office for the whole time of drawing, from the time of insurance, under a *bona fide* agreement without a stamp.

LOTUS. Birds-foot trefoil. In botany, a genus of the class diadelphia, order decandria. Legume cylindric, stiff; filaments wedge-form, wings converging longitudinally upwards; calyx tubular. Thirty species: chiefly Europeans, a few natives of the Levant and Palestine: two common to our own country. They may be thus subarranged:

A. Legumes few, not forming a head.

B. Penducles many-flowered, in a head.

The following species are the chief.

1. Lotus, with single, membranaceous, quadrangular pods, and spear-shaped bractes. 2. Lotus, with single membranaceous, quadrangular pods, and oval bractes, called winged pea. 3. Lotus, with conjugated, membranaceous, quadrangular pods, and oblong, oval bractes. 4. Lotus, with an erect stalk, terminated by a single taper, erect pod. 5. Lotus, with single, convex, incurved pods. 6. Lotus, with two narrow, compressed, nodding pods. 7. Lotus, with erect linear, strait pods, growing in pairs, an erect stalk, and alternate footstalks. 8. Lotus, with five arched, compressed pods, and diffused stalks. 9. Lotus, with three pods, an erect herbaceous stalk, and narrow leaves. 10. Lotus, with heads divided in the middle, a shrubby stalk, and shining leaves 11. Lotus, with hairy heads, an erect hairy stalk, and oval pods. 12. Lotus, with globular heads, an erect stalk, and straight smooth pods. 13. Lotus, with depressed heads, trailing stalks, and cylindrical pods. 14. Lotus, with heads divided into two equal parts, a very branching diffused stalk, and woolly leaves. 15. Lotus, with naked heads, and leaves placed by fives, sitting close to the branches, or the dorycnium of Montpelier.

The first species grows naturally near the sea, in many parts of Europe, and is a perennial plant, propagated by seeds, which should be sown where the plants are to remain. When they come up, they should be thinned, and left at the distance of two feet asunder, and afterwards kept clean from weeds. The fourth, sixth, and eighth species, are natives of the southern parts of Europe, and cultivated in like manner. The second and third species are annual plants, growing naturally in the south of Europe, and may be propagated from seeds in the manner directed for the first. The fifth species grows naturally in Sicily, Italy and Crete, and is an annual plant, requiring the same method of culture. The seventh and thirteenth species grow naturally in many parts of England, and are rarely admitted into gardens. Their roots are perennial, and difficult to be extirpated where they have had long possession of a piece of ground. The ninth species is an annual plant, which grows naturally in the island of St. James. It flowers all the summer and autumn, but is too tender to live in the open air of this country; the plants therefore must be kept in pots in the winter, placed in a warm, airy glass-case. This sort may be propagated by cuttings, during the summer season, planted on a bed of light earth, covering them close with a bell, or hand-glass, and screening them from the sun. In about five or six weeks they will have taken root; when they should be inured to the open air, and soon after planted in pots filled with fresh light earth, and placed in the shade till they have taken root; they may then be removed to a sheltered situation, where they may remain till autumn. This species may also be propagated by seeds, and treated in the like manner. The tenth and eleventh species are perennial plants, which grow naturally in the south of Europe: they may be propagated either by cuttings or by seeds, in the manner directed for the ninth sort. The twelfth is seldom cultivated, except in botanic gardens, for the sake of variety; and the fourteenth and fifteenth, which are natives of the south of Europe, may be propagated by seeds, which

should be sown in the spring in the places where the plants are to remain.

LOTUS (Egyptian). See NYMPHÆA.

LOTUS (Libyan). See RHAMNUS.

LOVAGE, in botany. See LIGUSTICUM.

LOUD. *a.* 1. Noisy; striking the ear with great force. 2. Clamorous; turbulent (*Prov.*).

LOUDEAC, a town of France, in the department of the North Coast. Here is an iron forge and a manufacture of thread. It is 20 miles S. of St. Brieux, and 27 S.S.E. of Guingamp. Lon. 2. 40 W. Lat. 48. 11 N.

LO'UDLY. *ad.* (from *loud.*) 1. Noisily; so as to be heard far (*Denh.*). 2. Clamorously (*Swift*).

LO'UDNESS. *s.* Noise; force of sound; turbulence; vehemence of clamour (*South*).

LOUDUN, a town of France, in the department of Vienne. It is remarkable for the tragical end of its rector, Urbain Grandier, who, in 1634, was burnt alive for having caused certain Ursulin nuns to be possessed with devils! It is seated on a mountain, 30 miles N.W. of Poitiers and 155 S.W. of Paris. Lon. 0. 17 E. Lat. 47. 2 N.

*To* LOVE. *v. a.* (lupian, Saxon.) 1. To regard with passionate affection (*Cowley*). 2. To regard with the affection of a friend (*Cow.*). 3. To regard with parental tenderness (*John*). 4. To be pleased with; to delight in (*Bacon*). 5. To regard with reverent unwillingness to offend (*Deuteronomy*).

LOVE. *s.* (from the verb.) 1. The passion between the sexes (*Pope*). 2. Kindness; good-will; friendship (*Cowley*). 3. Courtship (*Bacon*). 4. Tenderness; parental care (*Tillotson*). 5. Liking; inclination to (*Fenton*). 6. Object beloved (*Pope*). 7. Lewdness (*Shakspeare*). 8. Unreasonable liking (*Taylor*). 9. Fondness; concord (*Shaksp.*). 10. Principle of union (*South*). 11. Picturesque representation of love (*Dryden*). 12. A word of endearment (*Dryden*). 13. Due reverence to God (*Hammond*). 14. A kind of thin silk stuff (*Boyle*).

LOVE may be considered either as a principle, or as an affection. As a principle, it may be defined "an invariable predilection for good; an universal and permanent attachment to well-being or happiness." In this point of view it has been remarked, that the love of good, and solicitude to procure it, is not only the ruling principle of every sentient being; but it meets with the full approbation of every rational being. For nothing can excel that which is good, and nothing can be valuable but as it has a tendency to promote it. Hence when we speak of love abstractedly, we call it the principle of love; since it is the principle by which the whole tenour of our conduct is directed; and it retains that appellation, as long as we speak of it as a general principle of action.

When this principle is directed towards any particular object, it becomes an affection; that is, the mind becomes well disposed or pleasingly affected towards that object; and in cases when this love is more violent in its effects upon the system, it is even deemed a passion.

The affection will be diversified, and acquire various characters, according to the nature of the object, its relations to us, or the peculiar qualities it may seem to possess. It may relate to ourselves; to those with whom we are connected, by the closest bonds of nature or intimacy; to the whole of our species; to those beings of inferior order in the creation, which are rendered capable of possessing any portion of enjoyment; and even to things inanimate.

When the affection of love immediately relates to ourselves personally, it is called self-love: it marks the peculiar concern and solicitude we entertain for our own interest, prosperity, or enjoyment. This principle of self-love generally operates with the greatest force upon the mind; and every circumstance which affects our own happiness makes the most vivid impressions. This is naturally the source of many abuses, which have brought the term itself into disrepute. But this self-affection, when it does not interfere with the claims of others, is not only an innocent affection, but it manifests the wisdom and benevolence of the great Source of good. By rendering every being active in the pursuit of his own happiness, the greatest quantum of general good is most effectually secured. As the largest communities consist of individuals, were each individual to seek his own welfare, without prejudice to his neighbour, the individual stock of each would render happiness universal.

When our love or desire of good goes forth to others, it is termed good-will or benevolence. This operates with various degrees of force, according to our various connections and degrees of intimacy. It may possibly render the interests and happiness of those with whom we are more immediately connected, by the bonds of nature or friendship, equally dear to us as our own. It has in some instances been known to exert a more powerful influence. Of this truth, the love of parents towards their own offspring frequently presents us w th striking instances. All these powerful ties are usually characterized by the term affection, as the conjugal, parental, filial affections; and those who possess these attachments in an exemplary degree are termed affectionate parents, children, relatives, friends.

When love extends to the whole human race, it is termed philanthropy; a principle which comprehends the whole circle of social and moral virtues.

There is one important sense of the word love respecting which we shall be expected to say something, and yet respecting which we know not what to say, so as to satisfy either ourselves or our readers; we mean when love is used to signify that attachment between individuals of different sexes which is implanted in us by our Creator, for mutual happiness in a connubial state. Is it, as some have called it "the gravitation of the soul towards the beloved object?" Is it, as others say, "friendship modified in

consequence of its subsisting between persons of different sexes?" Does love, as Bruyere affirms, exclude friendship? Or, what is it that distinguishes love from friendship? Now, it is obvious to remark that with regard to love, one look, one glance, one conversation, often determines us: while friendship, on the contrary, is usually a long time forming, and after formation of slow growth. Love while it lasts often subsists entirely of itself, and sometimes even by those very means which might seem to extinguish it,—caprices, disdain, cruelty, absence, jealousy: friendship, on the other hand, requires all helps;—attention, confidence, and complaisance: if it be not supplied with some or all of these, it expires. Love must be confined to a single object, and derives its lustre proportionally from its constancy and attachment to that object; whereas friendship disdains any such boundary; to contract it, being often to violate it. What character is more despicable, more to be avoided, than a universal lover; what character so valuable as he who is ready (as occasions may offer, and according to their respective deserts), to be every man's friend?

Friendship and love, then, have an essential difference; while they agree in this, that in both the bond of union is real, or supposed excellence, varying only according to the manner in which different individuals estimate excellence, or what they account such. The difference is to be sought in something which can only exist where there is a difference of sexes, and animal desire is that which can only exist under such circumstances. That this constitutes an essential part of the complex affection which is distinctively called love is apparent from the consideration, that though a man may have sentiments of esteem and benevolence towards women who are both old and ugly, he never thinks himself to be in love with any one whom *he* reckons ugly, or to whom he does not feel the sensual appetite to have a stronger tendency than towards other individuals of her sex. Yet, that animal desire alone cannot constitute the affection of love is evident; because he who gratifies such a desire without esteeming its object, and wishing to communicate at the same time that he receives enjoyment, loves not the woman, but himself. Mere animal desire has nothing in view but the species and the sex of its object; and before it makes a selection it must be combined with sentiments very different with itself. Now, the first sentiment with which it is combined, and by which most men are induced to prefer one woman to another, seems to be that by which we are delighted with gracefulness of person, regularity of features, and beauty of complexion. Indeed it is not to be denied that there is something irresistible in female beauty. The most severe will not pretend that they do not feel an immediate prepossession in favour of a handsome woman; but this prepossession, even when combined with animal desire, does not constitute the whole of that affection which is called love. Personal beauty, with gracefulness, and the other concomitants, or what we deem beauty, and grace (for the real and supposed existence of these are all one as to their operation), strike us chiefly, if not entirely, on account of their being supposed to indicate sweetness of disposition or strength of intellect. Thus it is found that the perception of beauty (conceived to indicate estimable qualities) combined with animal desire is the first inducement which a man can have to prefer one woman to another. And in like manner, elegance of figure, a placid masculine countenance, with a person which indicates strength and agility, are the qualities which first tend to attach any woman to a particular man.

A woman, indeed, whose dispositions are gentle, delicate, and rather timid than bold, who is possessed of a large share of sensibility and modesty, and whose manners are soft and insinuating, must, upon moral principles, command the esteem and benevolence of every individual of the other sex who is possessed of sound understanding: but if her person be deformed, or not such as to excite some degree of animal desire, she will attract no man's love. In like manner, a man whose moral character is good, whose understanding is acute, and whose conversation is instructive, must command the esteem of every sensible and virtuous woman: but if his figure be disagreeable, his manner unpolished, his habits slovenly, or if he be deficient in personal courage, he will hardly excite desire in the female breast. It is only when the qualities which command esteem are in the same person united with those which excite desire, that the individual so accomplished can be an object of love to one of the other sex; but when these qualities are thus united, each of them increases the other in the imagination of the lover. The beauty of his mistress gives her, in his apprehension, a greater share of gentleness, modesty, and every thing which adorns the female character, than perhaps she really possesses; while his persuasion of her internal worth makes him, on the other hand, apprehend her beauty to be absolutely unrivalled. See BEAUTY.

There is an objection to this theory which it behoves us to obviate. Persons sometimes fall in love at first sight, while they are ignorant of character. Whenever this is the case the character is inferred, either by taking the countenance as an index, or by what is known of family connections, &c.

The affection generated in the way we have described will be more or less pure, and more or less permanent, according as the one or the other part of which it is compounded predominates. And hence appears the importance of a rigid examination into the origin and nature of the passion cherished by every individual.—Let him ascertain whether it is likely to be permanent—whether, when the object of his affection becomes old, faded, and feeble, he shall esteem her for the virtues of her character, or the suitableness of her qualities to his ideas of propriety, excellency, and mental loveliness.—From the whole, we think it appears, that the

affection between the sexes which deserves the name of love is inseparably connected with virtue and delicacy; that a man of loose morals cannot be a faithful or a generous lover; that in the breast of him who has ranged from woman to woman for the mere gratification of sensual appetite, desire must have effaced all genuine esteem, all correct power of appreciation, of female excellence; such a one, therefore, can never be expected either to become a pattern or to copy a pattern of conjugal affection. We shall conclude with the weighty apophthegm of Bacon: "Nuptial love maketh mankind; friendly love perfecteth it; but wanton love corrupteth and embaseth it."

LOVE APPLE, in botany. See SOLANUM.

LOVE-IN-A-MIST. See PASSIFLORA.

LOVE-LIES-BLEEDING. See AMARANTHUS.

LOVE (Tree of). See CERCIS.

LO'VEKNOT. *s.* (*love* and *knot.*) A complicated figure, by which affection interchanged is figured.

LO'VELETTER. *s.* (*love* and *letter.*) Letter of courtship (*Addison*).

LO'VELILY. *ad.* (from *lovely.*) Amiably; in such a manner as to excite love (*Otway*).

LO'VELINESS. *s.* (from *lovely.*) Amiableness; qualities of mind or body that excite love (*Addison*).

LO'VELORN. *a.* (*love* and *lorn.*) Forsaken of one's love (*Milton*).

LO'VELY. *a.* (from *love.*) Amiable; exciting love (*Tillotson*).

LO'VEMONGER. *s.* (*love* and *monger.*) One who deals in affairs of love (*Shaks.*).

LO'VER. *s.* (from *love.*) 1. One who is in love (*Dryden*). 2. A friend; one who regards with kindness (*Shakspeare*). 3. One who likes any thing (*Burnet*).

LO'UVER. *s.* (from *l'ouvert*, French.) An opening for the smoke (*Spenser*).

LO'VESECRET. *s.* (*love* and *secret.*) Secret between lovers (*Dryden*).

LO'VESICK. *a.* Disordered with love; languishing with amorous desire (*Granville*).

LO'VESOME. *a.* (from *love.*) Lovely (*Dryden*).

LO'VESONG. *s.* (*love* and *song.*) Song expressing love (*Shakspeare*).

LO'VESUIT. *s.* (*love* and *suit.*) Courtship (*Shaks.*).

LO'VETALE. *s.* (*love* and *tale.*) Narrative of love (*Milton.*)

LO'VETHOUGHT. *s.* (*love* and *thought.*) Amorous fancy (*Shaksp.*).

LO'VETOY. *s.* (*love* and *toy.*) Small presents given by lovers (*Pope*).

LO'VETRICK. *s.* (*love* and *trick.*) Art of expressing love (*Donne*).

LOUGH. *s.* (*loch*, Irish, a lake.) A lake; a large inland standing water (*Fairfax*).

LOUGHBOROUGH, a town of Leicestershire, distant about 110 miles from London. It is the second town in the county, and was in the Saxons' time a royal village. Its market is on Thursday; and its fairs are on April 25th, May 28th, August 1st, and November 2d. It has a large church, and a free school; besides a charity school for 80 boys and another for 20 girls. It has been very much reduced by fires, but is still a very agreeable town, with rich meadow-ground, on the Fosse, which runs here almost parallel with the river Soar. The new canal has made the coal trade here very extensive. Lon. 1. 10 W. Lat. 52. 48 N.

LOUGH-DERG, anciently *Derg-abhan*, i. e. "the river of the woody morass," from a river which issues out of this lake. This lough is situated in the county of Donegal and province of Ulster in Ireland, and is famous for having in it the island that contains St. Patrick's purgatory, which is a narrow little cell, hewn out of the solid rock, in which a man could scarce stand upright.—There is also a lake of this name situated between the counties of Galway and Tipperary.

LOUGH-NEACH, a loch or lake of Ireland, situated in the counties of Armagh, Down, Derry, and Antrim, and province of Ulster. It is the largest in Europe, those of Ladoga and Onega in Russia, and that of Geneva in Switzerland, excepted; being 20 miles long and 15 broad. The area of this lake is computed to be 100,000 acres. It is remarkable for a healing virtue; and likewise for petrifying wood, which is not only found in the water but in the adjacent soil at a considerable depth. On its shores several beautiful gems have been discovered. Its ancient name was Loch-eacha or Loch-Neach, from loch, "a lake," and neach, "wonderful, divine, or eminent." Its petrifying powers are not instantaneous, as several of the ancients have supposed, but require a long series of ages to bring them to perfection, and appear to be occasioned by a fine mud or sand, which insinuates itself into the pores of the wood, and which in process of time becomes hard like stone.

LOUGH-STRANGFORD, a lake of Ireland, situated in the county of Down and province of Ulster. It takes its present name from a small port-town called Strangford, seated on the west side of the narrow entrance into the sea. It was formerly known by the name of Lough-Cone or Lough-Coyne. It is a deep bay or inlet of the sea, about 17 miles long and 4 or 5 broad; it goes west as far as Downpatrick, and north as far as Comber and Newtown, and by computation covers 25,775 acres, Irish plantation measure. It abounds with excellent fish, particularly smelts; and off the bar there is a periodical herring fishery in or about August. The bar or entrance into this lough is about 3 miles below Strangford.

LO'VING. *participial a.* (from *love.*) 1. Kind; affectionate (*Hayward*). 2. Expressing kindness (*Esther*).

LO'VINGKINDNESS. *s.* Tenderness; favour; mercy (*Rogers*).

LO'VINGLY. *ad.* (from *loving.*) Affectionately; with kindness (*Taylor*).

LO'VINGNESS. *s.* (from *loving.*) Kindness; affection (*Sidney*).

LOUIS, the name of five emperors of Germany, two kings of Hungary, and of sixteen

kings of France, the tragic fate of the latter of whom will be in the recollection of all our readers. We quote from Watkins's Biographical Dictionary the following brief account of the last four kings of France, being all whose reigns appear of sufficient importance to demand a place in our pages.

LOUIS XIII. succeeded his father Henry IV. in 1610, under tuition of his mother Mary de Medicis, he being only nine years old when that melancholy event occurred. The marshal d'Ancre and his wife had an uncontrolled sway in the court till 1617, when he was assassinated with the king's consent, and his wife condemned to death as a sorceress. Vitry, who perpetrated this act, was made a marshal of France. His great minister was the bishop of Luçon, afterwards cardinal Richelieu, who indulged all the foibles of Louis, and extended his authority. He persuaded his master that the destruction of the protestants was necessary to his security. This brought on a civil war, in which the protestants were unsuccessful; Rochelle, the strongest place in their hands, was taken by the cardinal after a long siege in 1628, during which the English made two impotent attempts to throw relief into the town. The cardinal, who had perhaps the deepest political head of any man in his time, supported the protestants of Germany, and Gustavus Adolphus of Sweden, with a view of humbling the house of Austria, and aggrandizing the power of France. Richelieu, however, had considerable enemies at court, and was not much esteemed by the king himself. He retired from public affairs some time before his death, which happened in 1642; and the year following Louis died of a long and painful distemper. It is said that he regretted on his death-bed the rigour of Richelieu's administration, and the torrents of blood that had been shed thereby.

LOUIS XIV. son of the preceding, was only five years old when he succeeded to the throne. During his minority the kingdom was rent in pieces under the administration of his mother Anne of Austria, by the factions of the great, and the divisions between the court and parliament, for the most trifling causes, and upon the most despicable principles. The prince of Condé shone like a star of the first magnitude; sometimes a patriot, sometimes a courtier, and at others a rebel. He was opposed by the famous Turenne, who from being a protestant turned catholic. The French nation was involved in civil wars, but the queen mother having chosen cardinal Mazarine for her minister, he so well managed his affairs, that when Louis came to maturity he found himself a more absolute monarch than had ever been on the throne. On the death of that minister he had the luck to meet with a far better in Colbert, who formed new systems for the glory, commerce, and manufactures of France. The reign of Louis was glorious, but he himself was actuated by an ungovernable ambition. He disturbed the peace of his neighbours, and, without any just grounds, rendered Germany a melancholy field of desolation. In 1685 he committed a fatal impolicy in revoking the edict of Nantes, by which he drove many thousands of his best subjects into exile on account of their religion. He made and broke treaties merely for his convenience, and at length raised against himself a confederacy of nearly all the other princes of Europe, at the head of which was William III. king of England. He made a formidable stand against this alliance for some years, but at last the arms of Marlborough and Eugene proved too powerful for him. His reign from 1702 to 1715, was a series of defeats and misfortunes. A period was put to this war by the treaty of Utrecht in 1713. Louis died September 1, 1715. He married Maria Theresa, daughter of Philip IV. king of Spain, by whom he had issue only one son, that lived, Louis dauphin of France, who married a sister of the duke of Bavaria, by whom he had three sons, Louis, Philip, and Gaston. Louis the dauphin died in 1711, whereupon his eldest son Louis succeeded to the title of dauphin.—This prince married Mary Adelaide, daughter to the duke of Savoy, afterwards king of Sardinia, and died in 1712. His son Louis succeeded to the title of dauphin. Louis XIV. had several illegitimate children by madame de la Valiere, and madame de Montespan.

LOUIS XV. was the great grandson of the preceding, and succeeded him in 1715, at the age of five years, under the regency of Philip duke of Orleans. In 1723 he was declared of age. The beginning of his reign was rendered particularly distressing by the iniquitous Mississippi scheme of the famous Law, which ruined thousands of the wealthiest people in France. The duke of Orleans held the management of affairs till his death in 1723, and was then succeeded by the duke of Bourbon, who gave way to cardinal Fleury, a man of pacific intentions, but of no considerable talents. In 1734 the king of Poland died, and Louis supporting the election of Stanislaus against the elector of Saxony, a war broke out between France and Austria. Stanislaus lost his kingdom, but was suffered to retain the revenues of Lorraine, and a peace was concluded in 1738. On the death of the emperor Charles VI. in 1740, a new scene was opened. The imperial throne was filled by the elector of Bavaria, in violation of the pragmatic sanction, and this occasioned a new war, in which England bore a distinguished part in defence of Maria Theresa queen of Hungary. Peace was restored by the treaty of Aix-la-Chapelle in 1748. In 1755 the flame of war was rekindled between France and England, in which Prussia also bore a part. The French were defeated both by land and sea, and a treaty of peace was signed in 1763. The year following the order of jesuits was extinguished in France, and throughout Europe in 1773.—In 1774 Louis died, and was succeeded by his grandson,

LOUIS XVI. who was born at Versailles in 1754, and espoused in 1770 Maria Antoinette of Austria. His first minister was count de Maurepas, who engaged in schemes which proved ruinous to the nation. The share which

France took in the contest between England and America proved more destructive to herself than to her ancient enemy. The war which France rashly and unjustly provoked left her finances in a deplorable state, which could not be retrieved by all the schemes of Neckar. In 1786 a treaty of navigation and commerce was concluded between the courts of London and Versailles. The wretched condition of the public revenues rendered extraordinary measures necessary, and accordingly the parliament of Paris was convened; but this assembly not being sufficiently submissive, and a spirit of discontent prevailing throughout the kingdom, the meeting of the states-general was fixed for May 1, 1789. Not only France but all Europe looked at the passing scene with eager anxiety. The nation was on the eve of a civil war, and the king, wanting both firm friends and vigour of mind, soon saw himself involved in the unhappy contest which he studied to avoid. The states-general assembled, but consisted mostly of men of democratic principles, who inflamed the populace; and open insurrection soon ensued. On the 14th of July the Bastile was taken and razed. On the 17th of the same month Louis entered Paris, where he was received by M. Bailly the mayor, with this insulting address, as he presented to him the keys of the city: "These, sir, are the keys which were presented Henry IV. He came to reconquer his people; it is our happiness to have reconquered our king." The answer of the unfortunate monarch was dignified: "My people may always rely upon my affection." To detail all the atrocious insults which were offered, and patiently endured by this benevolent monarch, from this memorable period, would far exceed the limits to which we are confined. On the 20th of June, 1791, he was persuaded to make his escape from the land of murder; but was taken prisoner, with his queen and family, at Varennes. In 1792 the emperor and king of Prussia declared war against France. On the 10th of August this year the palace of the Thuilleries was attacked by a sanguinary mob, the Swiss guards were cut to pieces, and the king, queen, and royal family, obliged to take refuge in the national assembly. On the 2d and 3d of September the prisons were forced, and all the aristocrats, or such as bore the name, inhumanly massacred, without regard being paid to age or sex. A national convention, which had been called to determine on the charges against the king, met on the 24th, and royalty was thereby abolished in France. The Prussians and Austrians, who had marched into France, were obliged to retreat, owing to sickness and want of provisions. The French, under general Montisquiou, entered Savoy, and incorporated that country with the republic, contrary to their own declaration, that they would enter into no war with a view of conquest. Flushed with success, they set no bounds to their ambition, but took possession of all the Austrian Netherlands. Not only so, but the national convention, with unparalleled assurance, made a decree to grant fraternity and assistance to every people who wish to procure liberty; and they charged the executive power to send orders to the generals to give assistance to such people, and to defend citizens who have suffered, or that were then suffering, in the cause of liberty. No sooner had Antwerp fallen into their hands than they resolved to open the navigation of the Scheldt, contrary to all treaties; which measure forced Great Britain into a contest with the new republic. In the mean time Louis XVI. and his family were suffering the most shameful indignities in the prison of the Temple. The king was brought to his trial on the 11th of December, and after a mock parade of justice, still more offensive than that which once disgraced this kingdom, he was sentenced to death, and suffered with fortitude and piety under the guillotine, Jan. 21, 1793.

LOUIS, or *Knights of St. Louis*, the name of a military order in France, instituted by Louis XIV. in 1693. Their colours were of a flame colour, and passed from left to right; the king was their grand master. There were in it eight great crosses, and 24 commanders; the number of knights not limited. At the time of their institution, the king charged his revenue with a fund of 300,000 livres for the pensions of the commanders and knights. This institution was of course abolished with the monarchy.

LOUIS, *Lewis, Louis d'or*, or *Lewidore*, a French coin, first struck in 1640, under the reign of Louis XIII. and which had once a considerable currency. See MONEY.

*To* LOUNGE. *v. n.* (*lunderen*, Dutch.) To idle; to live lazily.

LO'UNGER. *s.* (from *lounge*.) An idler.

LOUISBURG, a town and capital of the island of Cape Breton, situated on a point of land on the south-east side of the island; its streets are regular and broad, consisting for the most part of stone houses, with a large parade at a little distance from the citadel; the inside of which is a fine square, near 200 feet every way. On its north side, while possessed by the French, stood the governor's house and the church; the other sides were taken up with barracks, bomb-proof; in which the French secured their women and children during the siege. The town is near half an English mile in length, and two in circuit. The harbour is more than half an English mile in breadth, from north-west to south-east in the narrowest part, and six miles in length, from north-east to south-west. In the north-east part of the harbour is a fine careening wharf to heave down, and very secure from all winds. On the opposite side are the fishing stages, and room for 2000 boats to cure their fish. In winter the harbour is totally impracticable, being entirely frozen, so as to be walked over: that season begins here at the close of November, and lasts till May or June: sometimes the frosts set in sooner, and are more intense; as particularly in 1745, when by the middle of October a great part of the harbour was already frozen.—The principal if not the only trade of Louisburg is the cod-fishery; the plenty of fish being remarkable, and at the same time better

than any about Newfoundland. The anchorage, or mooring, is good, and ships may run aground without any danger. Its entrance is not above 300 toises in breadth, formed by two small islands. Here is plenty of cod, and the fishery may, in general, be continued from April to the close of December. It was taken from the French by the English fleet under sir Peter Warren, and our American forces commanded by sir William Pepperel, in the year 1745; but afterwards restored to France by the treaty of Aix-la-Chapelle, in 1748. It was again taken by the English, under the command of admiral Boscawen and lieutenant-general Amherst, on the 27th of July, 1758, and its fortifications since demolished. Lon. 59. 50 W. Lat. 45. 55 N.

LOUISIANA, a country of North America, situated between the Mississippi and New Mexico; towards the south it is bounded by the Gulf of Mexico. Its northern boundaries are unknown. This country was first discovered by Ferdinand de Soto, a Spaniard, in the year 1541, but no settlement was attempted till the latter end of the next century. In the year 1682, M. de la Sale, a Frenchman, travelled through it, and returning to France, represented the country in such a light to Louis XIV. that a company was established for the purpose of settling a colony. The attempt, however, did not succeed, and in the year 1763 Louisiana was ceded to Spain. The soil is represented as rich and fertile, well watered with rivers abounding in fish. The timber plentiful and large, of all kinds that are found under the same degrees of latitude. The only two places of note are New Orleans and New Madrid.

LOUSE, in entomology. See PEDICULIS.

*To* LOUSE. *v. a.* To clear from lice.

LOUSEWORT. See PEDICULARIS and DELPHINIUM.

LO'USILY. *ad.* (from *louse.*) In a paltry, mean, and scurvy way.

LOU'SINESS. *s.* (from *lousy.*) The state of abounding with lice.

LO'USY. *a.* (from *louse.*) 1. Swarming with lice; overrun with lice (*Dry.*). 2. Mean; low born; bred on the dunghill (*Shakspeare*).

LOUISVILLE, a town of United America, in the state of Georgia: forty-five miles S.W. Augusta. Lon. 82. 42 W. Greenwich. Lat. 32. 55 N.

LOUISVILLE, a town of United America, in the state of Kentucky, on the south side of the Ohio: seventy miles W. Lexington. Lon. 86. 6 W. Lat. 38. 4 N.

LOUT. *s.* (*loete*, old Dutch.) A mean awkward fellow; a bumpkin; a clown (*Sidney*).

*To* LOUT. *v. n.* (hlutan, Saxon.) To bend; to bow; to stoop: obsolete (*Ben Johnson*).

*To* LOUT. *v. a.* To overpower (*Shaks.*).

LOUTH, a county of Ireland, in the province of Leinster, 29 miles long and 13 broad; bounded on the N. by Armagh and Carlingford bay, on the E. by the Irish sea, on the W. by Monaghan and E. Meath, from which last county it is parted on the S. by the Boyne. It is a fruitful country, contains 50 parishes, and sent before the union 10 members to parliament. Drogheda is the capital.

LOUTH, a town of Ireland, in a county of the same name, 18 miles N. by W. of Drogheda.

LOUTH, a corporate town of Lincolnshire, with a market on Wednesday and Saturday. Here is a noble Gothic church, with a lofty spire, and a free school, founded by Edward VI. Louth contains about 4000 inhabitants. It has a navigation by means of its brook, the Lud, to the German ocean, at Tetney Creek. It is 28 miles N.E. of Lincoln, and 148 N. of London. Lon. 0. 10 E. Lat. 53. 25 N.

LO'UTISH. *a.* (from *lout.*) Clownish; bumpkinly (*Sidney*).

LO'UTISHLY. *ad.* With the air of a clown; with the gate of a bumpkin.

LOUVAIN, a city of Austrian Brabant, with an old castle, and a celebrated university. Its walls are nearly seven miles in circumference, but within them are many gardens and vineyards. The public buildings are magnificent, and the university consists of a great number of colleges. Large quantities of cloth were formerly made here, but this trade is greatly decayed, and it is now chiefly remarkable for good beer, with which it serves the neighbouring towns. It was taken by the French in 1746, 1792, and 1794. It is seated on the Dyle, 14 miles E. by N. of Brussels, and 40 N.E. of Mons. Lon. 4. 31 E. Lat. 50. 53 N.

LOUVESTEIN, a fortress of the United Provinces, in Holland, on the W. end of an island, called Bommel Waert. In this castle the patriotic chiefs were imprisoned by prince Maurice; whence that party has ever since been called the Louvestein party. It is 16 miles E. of Dort. Lon. 5. 13 E. Lat. 50. 40 N.

LOUYS, or LOUIS (John), an engraver of considerable eminence, who flourished about the middle of the 16th century. According to Basan, he was a native of Flanders. He learned the art of engraving from Peter Soutman, at the time that Suyderhoef studied under the same master; and his usual style of engraving bears some resemblance to that of his master. One of his best prints is Diana, with her nymphs, reposing after the chase; a middling sized plate, lengthwise, from Rubens.

LOW. *a.* 1. Not high (*Milton*). 2. Not rising far upward (*Ezekiel*). 3. Not elevated in situation (*Burnet*). 4. Descending far downward; deep (*Milton*). 5. Not deep; not swelling high; shallow: used of water (*L'Estrange*). 6. Not of high price: as, *corn* is low. 7. Not loud; not noisy (*Waller*). 8. In latitudes near to the line (*Abbot*). 9. Not rising to so great a sum as some other accumulation of particulars (*Burnet*). 10. Late in time: as, *the* lower *empire*. 11. Dejected; depressed (*Prior*). 12. Impotent; subdued (*Graunt*). 13. Not elevated in station; abject (*Shakspeare*). 14. Dishonourable; betokening meanness of mind (*Milton*). 15. Not sublime; not exalted in thought or diction (*Felton*). 16. Submissive; humble; reverent (*Milton*).

LOW. *ad.* 1. Not aloft; not on high (*Creech*).

2. Not at a high price; meanly (*Pope*). 3. In times near our own (*Locke*). 4. With depression of the voice (*Addison*). 5. In a state of subjection (*Spenser*).

*To* Low. *v. a.* (from the adjective.) To sink; to make low (*Swift*).

*To* Low. *v. n.* (hlopan, Saxon.) To bellow as a cow (*Roscommon*).

LOWANDO, in mastiology. See Simia.

LO'WBELL. *s.* A kind of fowling in the night, in which the birds are wakened by a bell, and lured by a flame into a net.

LOWE, Loe, the termination of local names, comes from the Saxon hleap, a hill, heap, or barrow (*Gibson*).

*To* LO'WER. *v. a.* (from *low*.). 1. To bring low; to bring down by way of submission (*Pr.*). 2. To suffer to sink down (*Woodward*). 3. To lessen; to make less in price or value (*Child*).

*To* Lower. *v. n.* To become less; to fall; to sink (*Shakspeare*).

*To* Lower. *v. n.* 1. To appear dark, stormy, and gloomy; to be clouded (*Addison*). 2. To frown; to pout; to look sullen (*Dryden*).

Lo'wer. *s.* (from the verb.) 1. Cloudiness; gloominess. 2. Cloudiness of look (*Sid.*)

LO'WERINGLY. *ad.* (from *lower.*) With cloudiness; gloomily.

LO'WERMOST. *a.* (from *low*, *lower*, and *most.*) Lowest (*Bacon*).

LOWESTOFT is situated upon the most eastern point of land in England; it stands upon a lofty eminence, and commands an extensive prospect of the German ocean, and when beheld from the sea has the noblest and most beautiful appearance of any town upon the coast between Newcastle and London; it chiefly consists of an extensive arrangement of houses, whose line of direction is nearly N. and S. and consequently faces the sea; it stands upon a dry soil, upon the summit of a cliff, and enjoys a most salubrious air, keen, but bracing; and not being exposed to any of those unwholesome damps and vapours which generally arise from low grounds and marshes, it is rendered not only a very pleasant, but a very healthy situation.

The declivity of this cliff, which formerly was one continued slope of barren sand, is now converted, by modern improvements, into very beautiful hanging gardens, descending from the dwelling-houses above to the fish-houses at the bottom of the hill; and being interspersed with alcoves and summer-houses, are not only extremely pleasant and convenient to the inhabitants, but exhibit a very pleasing appearance when beheld from the sea.

At the bottom of these gardens is a long arrangement of fish-houses, which extend the whole length of the town, and are so numerous, that, had they been placed in a more compact form, would have been sufficient of themselves to have formed a considerable town. Lowestoft derives many conveniences from the fish-houses being detached from the other buildings of the town, and placed at the bottom of the hill; such as the easy conveyance of the herrings from the boats; also the avoiding those very offensive smells arising from the smoke and drainings of the fish, which, otherwise, it would be subject to, if the houses wherein the herrings are cured had been intermixed with the dwelling-houses; and consequently the town is thereby exempted from those disagreeable nuisances so much and so justly complained of in other places. Between the fish-houses and the top of the beach stand the boats employed in the herring-fishery, which are arranged before the town to a considerable length; also the lower light-house, conveniences for boat-building, and the bathing machines.

Lowestoft is about a mile in length, and consists chiefly of one principal street, running in a gradual descent from N. to S. which is intersected by several lanes or smaller streets from the west; it is well paved, particularly the high street, and consists of about 445 houses (exclusive of the fish-houses), which are chiefly built with brick: several of the houses have been lately rebuilt in the modern style, and make a handsome appearance. It contains about 2231 inhabitants. Lon. 1. 55 E. Lat. 52. 35 N.

LO'WLAND. *s.* (*low* and *land.*) The country that is low in respect of neighbouring hills; the marsh (*Dryden*).

Lowland iron ore, in oryctology. See Ferrum.

LO'WLILY. *ad.* (from *lowly.*) 1. Humbly; without pride. 2. Meanly; without dignity.

LO'WLINESS. *s.* (from *lowly.*) 1. Humility; freedom from pride (*Atterb.*). 2. Meanness; want of dignity; abject depression (*Dryden*).

LO'WLY. *a.* (from *low.*) 1. Humble; meek; mild (*Matthew*). 2. Mean; wanting dignity; not great (*Pope*). 3. Not lofty; not sublime (*Dryden*).

Lo'wly. *ad.* (from *low.*) 1. Not highly; meanly; without grandeur; without dignity (*Shakspeare*). 2. Humbly; meekly; modestly (*Milton*).

LOWN. *s.* (*liun*, Irish.) A scoundrel; a rascal: not in use (*Shakspeare*).

LO'WNESS. *s.* (from *low.*) 1. Contrariety to height; small distance from the ground (*Ad.*) 2. Meanness of character or condition, whether mental or external (*Shaks.*). 3. Want of rank; want of dignity (*South*). 4. Want of sublimity; contrary to loftiness of style or sentiment (*Donne*). 5. Submissiveness (*Bacon*). 6. Depression; dejection (*Swift*).

LOWTHO'UGHTED. *a.* Having the thoughts withheld from sublime or heavenly meditations; mean of sentiment (*Pope*).

LO'WSPIRITED. *a.* Dejected; depressed; not lively; not vivacious (*Locke*).

LOWTH (William), a learned divine, was born at London in 1661, and educated at Merchant Taylors' school, from whence he was elected to St. John's college, Oxford, where he proceeded to his degree of B. D. Dr. Mew, bishop of London, appointed him his chaplain, and gave him a prebend in his cathedral, and the rectory of Buriton in Hampshire. He died in 1732. His writings are valuable, and shew

him to have been a man of great learning and piety. The principal are, 1. Commentaries on all the Prophets, usually published with Patrick on the Old Testament, and Whitby on the New; 2. Directions for the profitable Reading of the Holy Scriptures, 12mo.

LOWTH (Robert), an illustrious prelate of the English church, was the son of the above, and born at Winchester in 1710. After receiving his education at Winchester school he went to New college, Oxford, where he prosecuted his studies with ardour and reputation. In 1741 he was elected professor of Hebrew poetry, and in that capacity delivered those admirable lectures, De Sacra Poesi Hebræorum, which have immortalized his name. About this time he became tutor to the marquis of Hartington, whom he accompanied in the tour of Europe. In 1750 bishop Hoadly gave him the archdeaconry of Winchester, and in 1754 the university of Oxford conferred on him the degree of D. D. by diploma. The year following he went over to Ireland as chaplain to the marquis of Hartington, lord lieutenant; and while there the bishopric of Limerick falling vacant he was promoted to it, but having set his mind on settling in England he exchanged that dignity for a prebend of Durham. In 1766 he was raised to the see of St. David's, from whence in the same year he was removed to Oxford, and in 1777 translated to London. In 1778 he published his translation of Isaiah. To his literary and theological abilities the translator joined the most critical knowledge of the character and spirit of the eastern poetry; and, accordingly, the prophecies of Isaiah (which, though almost always sublime or elegant, are yet sometimes obscure) were translated in a manner adequate to the highest expectations of the public. Several occasional discourses, which the bishop, by his station, was at different times called upon to deliver, were of course published, and are all worthy of their excellent author; but there is one on the kingdom of God, on the extension and progressive improvement of Christ's religion, and on the means of promoting these by the advancement of religious knowledge, by freedom of enquiry, by toleration, and mutual charity, which may be distinguished above the rest, as exhibiting a most comprehensive view of the successive states of the Christian church, and containing the truest principles of Christianity.

On the death of archbishop Cornwallis, bishop Lowth was offered the archiepiscopal seat, but declined it on account of his infirmities, and the severe domestic misfortunes which he had experienced. His eldest daughter Mary died at the age of 13, and his second expired in 1783, as she was presiding at the tea-table. He bore these trials, and his own personal sufferings, with the most christian fortitude, and died full of hope in 1787. Besides the abovementioned works, he wrote the Life of William of Wykeham, 8vo; an excellent Grammar of the English Language; several sermons; a Letter to Dr. Warburton bishop of Gloucester; and some beautiful poems, Latin and English.

Of the bishop's poetical pieces, none display greater merit than Verses on the Genealogy of Christ, and the Choice of Hercules, both written very early in his life. He wrote a spirited Imitation of an Ode of Horace, applied to the alarming situation of this country in 1745; and likewise some verses on the death of Frederick prince of Wales, with a few smaller poems. The following inscription on the tomb of his daughter beautifully displays his paternal affection and classic taste. As it is short, and, in our opinion, has all the merit of the ancient epitaph, the reader will probably be pleased with such a specimen of his lordship's Latinity.

"Cara, vale, ingenio præstans, pietate, pudore,
  Et plusquam natæ nomine cara, vale.
Cara Maria, vale. At veniet felicius ævum,
  Quando iterum tecum, sim modo dignus, ero.
Cara, redi, læta tum dicam voce, paternas,
  Eja, age in amplexus, cara Maria, redi."

Learning and taste, however, did not constitute bishop Lowth's highest excellence. Eulogium itself can scarcely ascend to extravagance when speaking of him either as a private man or as a pastor of the church of Christ. His amiable manners rendered him an ornament to his high station, whilst they endeared him to all with whom he conversed; and his zeal for the interests of true religion made him eager to promote to places of trust and dignity such clergymen as he knew were best qualified to fill them. Of his modesty, gentleness, and pleasing conversation, we have the testimony of one whose decision will hardly be disputed.—" It would answer no end (says bishop Warburton) to tell you what I thought of the author of Hebrew Poetry before I saw him. But this I may say, I was never more surprised, when I did see him, than to find him of such amiable and gentle manners, of so modest, sensible, and disengaged a deportment." He united, indeed, in an eminent degree, the qualities of the gentleman with those of the scholar: he conversed with elegance, as he wrote with accuracy. As a husband, a father, or the master of a family, he was as nearly faultless as the imperfections of humanity will easily permit. His temper, when roused by what he thought improper conduct, was indeed susceptible of considerable warmth; but if he could be highly offended, upon a slight concession he could likewise forgive. His heart was tender and sympathetic. He possessed a mind which felt its own strength, and decided on whatever came before it with promptitude and firmness. In those trials where affliction was to be suffered or subdued he behaved as a man and a Christian. His piety had no tincture of moroseness; his charity no leaven of ostentation. To his whole diocese he was endeared by his laudable discretion and his useful zeal. To the world he was a benefit by his exemplary life and his splendid abilities. And whilst virtue and learning are reverenced among men, the memory of Lowth will be respected and admired.

LOXIA. Grosbeak. In zoology, a genus of the class aves, order passeres. Bill strong, thick,

convex, rounded at the base, lower mandible bent in at the edge; nostrils small, round, at the base of the bill; tongue truncate.

In the loxia, emberiza and fringilla genera both mandibles are moveable, by which means they are able to shell and break in pieces the seeds they feed upon. The loxia is a very numerous tribe, comprising a hundred and one species, of which five are British. We shall enumerate a few.

1. L. curvirostra. Crossbill. This is the most remarkable bird of this tribe. Both mandibles of the bill are hooked, and turned different ways, so that they do not meet at the point. This extraordinary bill is not uniformly in the same direction: in some individuals the under mandible is twisted to the right, in others, to the left side; a circumstance which proves that the variation of the bill is owing to certain uses to which it is applied by the bird, and not to any fixed appointment in nature. This species, as well as the former, is but an inconstant visitor of the British islands. It inhabits more generally Germany, Switzerland, the Alps, and Pyrenées; where it is permanent the whole year. Birds of this species migrate, from unknown causes, into other countries, not regularly, but in the course of several years: driven, perhaps, from their native country by some particular temperature of the weather, that destroys their food, or proves hurtful to their constitutions. They inhabit the pine-forests; and feed upon the cones, for the scaling of which the cross form of the lower mandible is admirably suited. The seed of apples is also a favourite food of these birds; and they are said to be so dextrous in finding it, that they divide an apple with a single stroke of their beak. Their colours are extremely apt to change at different seasons of the year, and even in the course of a single month. The males, in particular, vary from deep red to orange and yellow. The females, which are green, change into different shades of the same hue. The nest is hemispherical, and built on the branches of high trees: eggs whitish, with red spots towards the thicker end.

2. L. pyrthula. Bulfinch. This species, which, in its natural state, has but two or three very harsh notes, is so docile a bird, that, by a regular education, it becomes one of the greatest proficients in music. The female also acquires the talent of song; a circumstance by which she is distinguished from the whole sex in the feathered race, being the only female to whom nature has granted that endowment. The bulfinch may be taught to speak, as well as to sing; and many, thus accomplished, are brought annually from Germany to London. He utters his little phrases, says Buffon, with such an air of discernment and penetration, that you are apt to believe him animated by an intelligent principle. The male is distinguished from the female by the superior blackness of its crown, and by the rich crimson that adorns its cheeks, breast, belly, and throat; those parts of the female being of a dirty buff colour. The plumage of this species is variable, some individuals being wholly black; others white with black spots on the back; or with the head neck, breast and belly rosy.

3. L. coccothranstes. Hawfinch. Chesnut-ash; wings with a white line; middle quill-feathers rhombic at the tips; tail-feathers black at the base of the thinner web. Inhabits Europe, rarely England: six and three quarters inches long; feeds on berries and the kernels of the strongest stones, which its very strong bill breaks with ease: builds in the forky branches of trees, and lays five roundish, bluish-green eggs, spotted with brown.

4. L. cardinalis. Cardinal grossbeak. Crested, red; frontlet black; bill and legs blood-red. Inhabits North America; nearly eight inches long; sings very finely in spring and summer; feeds on grain and Indian corn, which it hoards up.

5. L. chloris. Green-finch. Yellowish-green; primary quill-feathers edged with yellow; four lateral tail-feathers pale yellow at the base. Inhabits England and Europe generally, and Kamschatka; builds in hedges, and is easily made tame: lays from five to six pale-green eggs with blood-coloured spots.

6. L. sulphurata. Brimstone grosbeak. Olive-brown; throat and belly pale-yellow; eye-brows yellow; bill horn-colour. Inhabits in flocks near the Cape of Good Hope; five and three quarters inches long; frequents the banks of rivers, and builds a pendulous nest with a long neck beneath in trees and shrubs.

7. L. Philippina. Philippine grosbeak. Brown, beneath yellowish-white; crown and breast pale-yellow; chin brown. Another variety with the tail and quill-feathers greenish brown, edged with yellow. The female is reddish below. The first inhabits the Philippine Isles, the second Abyssinia: five and a half inches long: constructs a curious nest with the long fibres of plants or dried grass, and suspends it by a kind of cord nearly half an ell long from the end of a slender branch of some tree, that it may be inaccessible to snakes and other hostile animals; the interior part consists of three divisions; the first is occupied by the male, the second by the female, and the third contains the young; in the first apartment, where the male keeps watch while the female is hatching, a little tough clay is placed on one side, and on the top of this clay a glow-worm, which affords its inhabitants light in the night-time. The nest of the second variety is spiral, with an opening on one side, which is always turned from the rainy quarter.

8. L. Abyssinica. Abyssinian grosbeak Yellowish; crown, temples, throat and breast black: shoulders blackish; quill and tail-feathers brown, edged with yellow. Inhabits Abyssinia: size of the haw-finch: makes a pyramidal, pendant nest, the opening of which is on one side, facing the east; it is divided in the middle by a partition, and the nest is within this cavity on one side; by this mean it is secure from the intrusion of snakes, squirrels, monkies, and other mischievous animals, and defended from the westerly rains, which in Abyssinia last for six months together.

9. L. pensilis. Pensile grosbeak. Green; head and throat yellow; ocular band green; belly grey; vent rufous-red; bill, legs, tail and quill-feathers black, the last edged with green. Inhabits Madagascar; size of a house-sparrow; constructs a pensile nest of straw and reeds, shaped like a bag, with an opening beneath, on one side of which is the true nest. This bird does not chuse a new situation every year, but fastens a new nest to the end of the last, often as far as a chain of five nests in succession; builds in large societies, and brings three at each hatch. Irids yellow.

10. L. socia. Sociable grosbeak. Rufous-brown, beneath yellowish; frontlet black; tail short; bill black. Inhabits the interior parts of the Cape of Good Hope; five and a half inches long. These live together in vast tribes of from eight hundred to a thousand at times, under one common roof, containing their several nests, which is built on a large species of mimosa.

LOXODROMIC CURVE, or SPIRAL, is the same as the rhumb line, or path of a ship sailing always on the same course in an oblique direction, or making always the same angle with every meridian. It is a species of logarithmic spiral, described on the surface of the sphere, having the meridians for its radii.

LOXODROMICS, the art or method of oblique sailing, by the loxodromic or rhumb line.

LO'YAL. *a.* (*loyal*, French.) 1. Obedient; true to the prince (*Knolles*). 2. Faithful in love; true to a lady, or lover (*Milton*).

LO'YALIST. *s.* (from *loyal.*) One who professes uncommon adherence to his king (*Howel*).

LO'YALLY. *ad.* (from *loyal.*) With fidelity; with true adherence to a king; with fidelity to a lover (*Pope*).

LO'YALTY. *s.* (*loiauté*, French.) 1. Firm and faithful adherence to a prince (*Milton*). 2. Fidelity to a lady, or lover.

LOYALTY is also the name of a fund, at 5 per cent, which originated in 1796, by a voluntary subscription; but was raised for the service of the year 1797. Its capital in October, 1804, was 22,352,456*l*. 5*s*. This fund was paid off in 1805.

LOYOLA (Ignatius), the founder of the jesuits, was born of a considerable family, in the province of Guipuscoa in Spain, in 1491. He was brought up to the military profession, and obtained a commission in the Spanish army; but having his leg broken at the siege of Pampeluna, he made a vow to the Virgin, that if he recovered he would go on pilgrimage to Jerusalem, and devote himself to a religious course of life. When his cure was completed he performed his engagement with the most scrupulous exactness. After studying the Latin language a short time at Barcelona, Loyola commenced preacher, and began to gather disciples; for which he was twice imprisoned. He went on, however, in spite of opposition, and at length had the sanction of Paul III. to his order, which was called the society of Jesus. That pope afterwards confirmed the order without any restriction, and Ignatius had the satisfaction of seeing his institution most widely spread in different parts of the world. He died at Rome in 1558; and was canonized by pope Gregory XV. in 1622. The jesuits continued to possess the greatest power and most extensive connections of any body of men till the beginning of the 18th century, when they began to decline very rapidly. At length they were totally suppressed by Clement XIV. in 1773. See JESUITS.

LOZENGE, in heraldry, a four-cornered figure, resembling a pane of glass in old casements. See HERALDRY. Though all heralds agree, that single ladies are to place their arms on lozenges, yet they differ with respect to the causes that gave rise to it. Plutarch says, in the Life of Theseus, that in Megara, an ancient town of Greece, the tomb-stones, under which the bodies of the Amazons lay, were shaped after that form; which some conjecture to be the cause why ladies have their arms on lozenges. S. Petra Sancta will have this shield to represent a cushion, whereupon women used to sit and spin, or do other housewifery. Sir J. Ferne thinks it is formed from the shield called *tessera*, which the Romans finding unfit for war, did allow to women to place their ensigns upon, with one of its angles always uppermost.

LOZENGES, among jewellers, are common to brilliant and rose diamonds. In brilliants, they are formed by the meeting of the skill and star facets on the bezil; in the latter, by the meeting of the facets in the horizontal ribs of the crown. See FACETS.

LOZENGE is also a form of medicine, made into small pieces, to be held or chewed in the mouth till they are melted there: the same with what are otherwise called *trochisci*, troches.

LOZERE, a department of France, including the late province of Gevaudan. It is a mountainous barren country, and receives its name from one of its principal mountains. Mende is the capital.

LP. A contraction for *lordship*.

LU'BBARD. *s.* (from *lubber.*) A lazy sturdy fellow (*Swift*).

LU'BBER. *s.* (*lubbed*, Danish, fat.) A sturdy drone; an idle, fat, bulky losel; a booby (*Car*).

LU'BBERLY. *a.* (from *lubber.*) Lazy and bulky (*Shakspeare*).

LU'BBERLY. *ad.* Awkwardly; clumsily (*Dryden*).

LUBEC, a free and imperial city and seaport of Lower Saxony, in the duchy of Holstein. It was the head of the famous hanseatic league, formed here in 1164, and the most commercial city and powerful republic of the North. Her fleet set the northern powers at defiance, and rode mistress of the Baltic. But it now retains not a shadow of its former power, and has lost great part of its trade. The houses are built in a very ancient style; the doors being so large as to admit carriages into the hall, which frequently serves for a coachhouse; and the walls of many houses

bear the date of the 15th century. The town-house is a superb structure, and has several towers. Here is also a fine exchange, built in 1683. The inhabitants are all Lutherans, and the chief preacher has the title of superintendant. There are five large churches, one of which is the cathedral, whose body is of an extraordinary length, containing several curiosities: such as a handsome statue of the Virgin Mary, a curious clock, and a prodigious large organ. There were formerly four convents; and in that of St. John there are still some protestant girls, under the government of an abbess. That of St. Mary Magdalen is turned into an hospital; that of St. Ann is made a house of correction; and the monastery of St. Catherine is now a handsome college. Lubec is seated at the confluence of some rivers, the largest of which is the Trave, 14 miles S.W. of the Baltic, and 30 N.E. of Hamburgh. Lon. 10. 44 E. Lat. 53. 52 N.

LUBEC (Bishopric of), a small bishopric, in the duchy of Holstein. It has been enjoyed by protestant princes of the house of Holstein ever since 1561, when Lutheranism was established here.

LUBEC, an island of the Indian Ocean. Lon. 112. 22 E. Lat. 5. 50 S.

LUBEN, a town of Silesia, capital of a circle of the same name, in the principality of Lignitz, 22 miles N.W. of Breslaw. Lon. 16. 28 E. Lat. 51. 20 N.

LUBIN (Eilhard), was professor of poetry in the university of Rostock in 1595; and ten years after was promoted to the professorship of divinity. He wrote notes on Anacreon, Juvenal, Persius, &c. and several other works; but that which made the most noise is a treatise on the nature and origin of evil, entitled, Phosphorus de causa prima et natura mali, printed at Rostock in 1596; in which we have a curious hypothesis to account for the origin of moral evil. He supposed two coeternal principles; not *matter* and *vacuum*, as Epicurus did; but God, and *nihilum*, or *nothing*. This being published against by Grawer, was defended by Lubin; but after all, he is deemed better acquainted with polite literature than with divinity. He died in 1621.

LUBLIN, a handsome and considerable town of Poland, capital of the palatinate of the same name, with a citadel, a bishop's see, an university, and a handsome Jewish synagogue. Here the judicial courts for all Poland are held. It has three fairs frequented by merchants from all nations. It is seated on the river Bystrzna. Lon. 22. 44 E. Lat. 51. 14 N.

*To* LU'BRICATE. *v. a.* (from *lubricus*, Lat.) To make smooth or slippery; to smooth.

LUBRI'CITY. *s.* (*lubricus*, Latin.) 1. Slipperiness; smoothness of surface. 2. Aptness to glide over any part, or to facilitate motion (*Ray*). 3. Uncertainty; instability (*L'Estr.*) 4. Wantonness; lewdness (*Dryden*).

LU'BRIC. *a.* (*lubricus*, Latin.) 1. Slippery; smooth on the surface (*Crashaw*). 2. Uncertain; unsteady (*Wotton*). 3. Wanton; lewd (*Dryden*).

LU'BRICOUS. *a.* (*lubricus*, Latin.) 1. Slippery; smooth (*Woodward*). 2. Uncertain (*Glanville*).

LUBRIFICA'TION, *s.* (*lubricus* and *fio*, Lat.) The act of smoothing (*Ray*).

LUBRIFA'CTION. *s.* (*lubricus* and *facio*, Lat.) The act of lubricating or smoothing.

LUCANIA, a country of Italy, and a part of Magna Græcia; bounded on the north by the river Silarus, by which it was separated from the Picentini, and by the river Bradanus, by which it was parted from the Apuli Peucetii; on the south by the Laus, which separated it from the Brutii; on the east by the Sirus Tarentinus; and on the west by the Tuscan sea. Lucani, the people, descendants of the Samnites. Lucanus, the epithet, (Horace). *Lucæ boves* denoted elephants; first seen in Pyrrhus's wars in Lucania, whence the appellation.

LUCANUS. In zoology, a genus of the class insecta, order coleoptera. Antennas clavate, the club compressed, and divided into short pectinate leaves; jaws projecting beyond the head so as to resemble horns, toothed; two palpigerous tufts under the lip. Twenty-six species scattered over the globe; of which three are common to our country, and are some of the largest of the British insects.

The lucani feed upon the liquor that exudes from oaks, which they suck with their tongues. The females deposit their eggs in the trunks of decayed trees, such as the oak and the ash. The larvæ or grubs lodge under the bark or in the hollow of old trees, which they gnaw and reduce into a fine powder, and there transform themselves into chrysalides. With the noxious effects of these animals on growing timber we are not acquainted; but notwithstanding their enormous size, it is probable that they are far less destructive than those that prey upon the roots of corn. We shall offer an example or two.

1. L. cervus; Stag-beetle; readily distinguished by its superior magnitude, which entitles it to the first rank among the insect tribes: it is however characterized by another peculiarity no less singular, and that is, the large moveable maxillæ, or jaws, resembling in form the horns of a stag, whence the specific name. These instruments are broad and flat, projecting from the head nearly one third of the animal's length. They have in the middle, towards the inner part, a small branch, and at their extremity are forked.

An insect of such an uncommon size as the stag-beetle, and of such singular conformation, has attracted the notice of all the entymologists. The female is distinguished by the comparative minuteness of her horns, which are not above half the size of those of the male; both, however, are armed in the anterior side with small teeth, throughout the whole of their length; and both are sometimes as red as coral, which gives these animals a very beautiful appearance.

The head that supports these romantic horns is broad, short, and irregular; and the thorax,

which intervenes between it and the body, is narrower than either, and marginated around. The shells of this beetle are very plain, being unadorned with either streaks or lines. The colour of the whole animal is uniformly of a deep brown.

Their residence is commonly the oak; in some parts of the country they are but rarely to be met with; and though the largest of all the coleopterous class in this part of the world, are much smaller than those of the same species, in countries where woods are more extensive and the climate is warmer. In these last quarters they acquire an amazing strength and vigour; and the maxillæ, whose ordinary office is to tear the bark of trees, are occasionally converted into offensive weapons, which are carefully avoided by such as have experienced the severity of their bite.

2. L. parallelepipidus, Parallelipiped Beetle. The body of this species is black; the horns smaller than those of the preceding, which in other respects it nearly resembles, and the form oblong, and parallelipipde, as its name imports. It frequents the meadow grounds, and its habits appear different from those of the preceding species.

Lucanus (M. Annæus), a native of Corduba in Spain, was early removed to Rome, where his rising talents and lavished panegyrics recommended him to Nero, who raised him to the dignity of an augur and quæstor before he had attained the proper age. A poetical contest then took place between Lucan and Nero, in which the former obtained an easy victory; this excited not only the jealousy but the resentment of the emperor. The insults to which Lucan was exposed provoked him at last to join Piso in a conspiracy against the emperor. The plot was discovered, and the poet had nothing left but to chuse the manner of his execution. He had his veins opened in a warm bath. He died in his 26th year, A.D. 65. Of all his compositions, none but his Pharsalia remains, which is an unfinished account of the civil wars of Cæsar and Pompey. He wrote a poem upon the burning of Rome, now lost. A good English version of the Pharsalia has been given by Mr. Nicholas Rowe.

Lucanus (Ocullus or Ucullus), an ancient Pythagorean philosopher, whose age is unknown. He wrote, in the Attic dialect, a book on the nature of the universe, which he deemed eternal, and from it were drawn the systems adopted by Aristotle, Plato, and Thilo Judæus. This work was first translated into Latin by Nogarola.

LUCAR DE BARAMEDA (St.), a handsome and considerable town of Spain, with a very good harbour, well defended, in Andalusia. It was once the greatest port in Spain, before the galleons unloaded their treasure at Cadiz. It is seated at the mouth of the river Guadalquiver. Lon. 5. 54 W. Lat. 36. 58 N.

Lucar de Guadiana (St.), a strong town of Spain, in Andalusia, on the confines of Algarve; seated on the river Guadiana, with a little harbour. Lon. 8.16 W. Lat. 37. 18 N.

Lucar la Major (St.), a small town of Spain, in Andalusia, with the title of a duchy. It is seated on the river Gaudiana, in Lon. 5. 33. W. Lat 37. 36. N

LUCARIA, a feast celebrated at Rome on the 18th of July, in memory of the flight of the Romans into a great wood, where they found an asylum, and saved themselves from destruction.

LUCAS (Jacobs), an eminent artist, more generally known by the name of Lucas van Leyden, or Hugense, was born at Leyden in 1494. He received his first instructions in the art of painting from his father Hugues Jacobs; but completed his studies in the school of Cornelius Engelbrecht. He gained much money by his profession, and being of a generous turn of mind, he spent it freely, dressed well, and lived in a superior style. It is said that a few years before his death he made a tour into Zealand and Brabant; and during his journey, a painter of Flushing, envious of his great abilities, gave him poison at an entertainment; which, though very slow, was too fatal in its effect, and put an end to his life, after six years languishing under its cruel influence. Others, denying the story of the poison, attribute his death to his incessant industry. The superiority of this artist's genius manifested itself in his infancy: for his works, even from the age of nine, were so excellent, as to excite the admiration of all cotemporary artists; and when he was about 15, he painted a St. Hubert, which gained him great applause. His tone of colouring (Mr. Pilkington observes) is good, his attitudes (making a reasonable allowance for the stiff German taste) are well chosen, his figures have a considerable expression in their faces, and his pictures are very highly finished. He endeavoured to proportion the strength of his colouring to the different degrees of distance in which his objects were placed: for in that early time the true principles of perspective were but little known, and the practice of it was much less observed. In the town-hall at Leyden, the most capital picture of Lucas, the subject of which is the Last Judgment, is preserved with great care; the magistrates having refused very large sums which have been offered for it.

This artist painted not only in oil, but also in distemper and upon glass. Nor was he less eminent for his engraving than for his painting. He carried on a familiar and friendly correspondence with Albert Durer, who was his cotemporary; and it is said, that as regularly as Albert Durer published one print, Lucas published another, without the least jealousy on either side, or wish to depreciate each other's merit. And when Albert came into Holland upon his travels, he was received by Lucas in a most cordial and affectionate manner. His style of engraving, however, according to Mr. Strutt, differed considerably

from that of Albert Durer, and seems evidently to have been founded upon the works of Israel van Mechlen. His prints are very neat and clear, but without any powerful effect. The strokes are as fine and delicate upon the objects in the front, as upon those in the distances; and this want of variety, joined with the feebleness of the masses of shadow, give his engravings, with all their neatness, an unfinished appearance, much unlike the firm substantial effect which we find the works of Albert Durer.

Lucas (Brugensis Francis), dean of St. Omer, was a learned divine, and well skilled in the oriental languages. He died in 1619. His works are wholly elucidations of the Holy Scriptures.

Lucas (Dr. Richard) a learned and pious divine, was born at Presteign in Radnorshire, in 1648, and educated at Jesus college, Oxford, where he proceeded to his degree of D.D. In 1683 he became vicar of St. Stephen, Coleman-street, London, and lecturer of St. Olave, Southwark. In 1691 he was installed prebendary of Westminster. For some years before his death he was totally blind. He died in 1715, and was buried in Westminster abbey. He wrote, 1. Practical Christianity; 2. An Enquiry after Happiness, 2 vols, 8vo; 3. Five volumes of Sermons, 8vo.

LUCCA, a small republic of Italy on the coast of the Mediterranean, between the territory of Genoa on the west, Modena on the north, and Tuscany on the east. According to Keysler, it is only about thirty miles in circumference, but is exceedingly fertile and populous. It contains, besides the city of Lucca, 150 villages. The number of inhabitants is computed at 120,000. The government is lodged in a gofalonier, whose power is much the same with that of the doges of Venice and Genoa. He is assisted by nine counsellors; but the power of all the ten continues only for two months; during which time they live in the state palace and at the public expence. They are chosen out of the great council, which consists of 240 nobles; but even this council is changed by a new election every two years. The revenues of the republic are about 400,000 scudi or crowns; out of which they maintain 500 men by way of regular force, and 70 Swiss as a guard to their acting magistrates. The city of Lucca is situated on a plain, terminating in most delightful eminences, adorned with villas, summer-houses, corn-fields, and plantations of every kind; so that nothing either for use or pleasure is here wanting. The city, which is about three Italian miles in circumference, has regular well lined fortifications; and its streets, though irregular, are wide, well paved, and full of handsome houses. The number of its inhabitants is computed to be above 40,000; and they carry on large manufactures, especially of silk stuffs. Lucca has a bishop, who enjoys several extraordinary privileges; and its cathedral is gothic. The city stands in lon. 10. 35 E. lat. 43. 50 N.

Such was the state of the republic and city of Lucca: they now form a part of what Napoleon pleases to have called the kingdom of Italy; whether any vestige of the former government is permitted to remain we know not.

LUCE. *s.* (perhaps from *lupus*, Latin.) A pike full grown (*Shakspeare*).

LU'CENT. *a.* (*lucens*, Latin.) Shining; bright; splendid (*Ben Jonson*).

LUCENA, a town of Spain, in the province of Cordova, 29 miles S.S.E. of Cordova, and 40 N.W. of Grenada. Lon. 3. 50 W. Lat. 37. 28 N.

LUCERA, an ancient town of Naples, in Capitinata, with a bishop's see. The town is small but populous, and has a manufacture of cloth. It is 30 miles W.S.W. of Manfredonia, and 65 N.E. of Naples. Lon. 15. 34 E. Lat. 41. 28 N.

LUCERN, or Lucerne, one of the cantons of Swisserland, and the most considerable except Zuric and Bern. It is 30 miles in length and 20 in breadth; bounded on the E. by the cantons of Underwalden, Schweitz, and Zug, and on all the other sides by the canton of Bern. The air is mild, and the soil uncommonly fertile. Freedom and openness of manners characterize the inhabitants, who are Roman catholics; and they can send 16,000 men into the field. The government of this republic is entirely aristocratical, or rather oligarchical. The sovereign power resides in the council of one hundred, comprising the senate, or little council. The former is the nominal sovereign; but the whole power resides in the latter, consisting of 36 persons, who are formed into two divisions, which exercise the office by rotation. The division which retires at the end of six months confirms that which comes into office; and as the vacant places in the senate are filled up by its own body, the power remains in the possession of a few patrician families. The senatorial dignity, moreover, may be considered, in some degree, as hereditary; the son generally succeeding his father, or the brother his brother. The chiefs of the republic are two magistrates, called advoyers, who are chosen from the senate by the sovereign, and annually confirmed.

Lucern, the capital of the canton of Lucern, in Swisserland. It is divided into two parts by a branch of the Reuss, which falls into the lake, on which the town is seated. It scarcely contains 3000 inhabitants, has no manufactures of consequence, and little commerce. The pope has always a nuncio resident here. In the cathedral is an organ of a fine tone, and of an extraordinary size; the centre pipe is 40 feet in length, near three in breadth, and weighs 1100 pounds. The bridges which skirt the town, round the edge of the lake, are the fashionable walk of the place, and remarkable for their length. Being covered at the top and open at the sides, they afford a constant view of the delightful and romantic country. They are decorated with coarse paintings, representing the histories of the Old

Testament, the battles of the Swiss, and the dance of death. Lucern is 30 miles S.W. of Zuric, and 35 E. of Bern. Lon. 8. 6 E. Lat. 47. 5 N.

The Lake of Lucerne exhibits greater variety and more picturesque scenery than any other of the Swiss lakes. It is seven leagues long in a right line, and three wide about Kussnacht; but the shape is very irregular. The whole south side is bordered by high mountains; but the north exhibits hills of no great height. The narrow gulph that extends towards the west is bordered on the north and north-west by mount Pilat, which is a single mountain rising boldly more than 6000 feet above the lake; and on the south by mount Burgenburg. Stanz-Stadt, belonging to the canton of Underwald, is on this side; and hereabouts the lake is deepest. Kussnacht is on the point of the other gulph, which extends towards the east, and is wider than the former. All the country to the west of these gulphs, and part of it to the north of the latter, belongs to the canton of Lucerne; but that which is to the south and north-east is dependent on the canton of Zug. All the mountains on the left shore of the lake belong to the canton of Underwald; those on the right, partly to the canton of Uri, partly to that of Schweitz, partly to the little republic of Gersaw, but principally to the canton of Lucerne.

Lucerne, in botany. See Medicago and Husbandry.

LUCERNARIA. In zoology, a genus of the class vermes, order mollusca. Body gelatinous, wrinkled, branched; mouth placed beneath. Three species; inhabit the northern seas, on fuci and ulvæ; generally adhering firmly to their habitation, and seldom changing their abode: they feed on polypes, or onisci; the body is commonly headless and eyeless, with granulated tubercles, resembling so many fascicles or bundles of tentacles, each containing in one species from thirty to forty; in another sixty.

LUCIA (St.), one of the Caribbee islands in the West Indies, about 22 miles long, and 11 broad, the middle of it lying in N. lat. 39. 14. W. lon. 27. 0. It was first settled by the French in 1650; but was reduced by the English in 1664, who evacuated it in 1666. The French immediately resettled the island, but were again driven away by the Caribbs. As soon as the savages were gone the former inhabitants returned, but only for a short time; for being afraid of falling a prey to the first privateer that should visit their coasts, they removed either to other French settlements that were stronger, or which they might expect to be better defended. There was then no regular culture or colony at St. Lucia; it was only frequented by the inhabitants of Martinico, who came thither to cut wood and to build canoes, and who had considerable docks on the island. In 1718 it was again settled by the French; but four years after it was given by the court of London to the duke of Montague, who was sent to take possession of it. This occasioned some disturbance between the two courts; which was settled, however, by an agreement made in 1731, that, till the respective claims should be finally adjusted, the island should be evacuated by both nations, but that both should wood and water there. This precarious agreement furnished an opportunity for private interest to exert itself. The English no longer molested the French in their habitations; but employed them as their assistants in carrying on with richer colonies a smuggling trade, which the subjects of both governments thought equally advantageous to them. This trade has been more or less considerable till the treaty of 1763, when the property of St. Lucia was secured to the crown of France. After that time the colony flourished considerably. In the beginning of the year 1772, the number of white people amounted to 2018 souls, men, women, and children; that of the blacks to 663 freemen, and 12,795 slaves. The cattle consisted of 928 mules or horses, 2070 head of horned cattle, and 3184 sheep or goats. There were 38 sugar plantations, which occupied 978 pieces of land; 5,395,889 coffee-trees; 1,321,600 cocoa plants; and 367 plots of cotton. There were 706 dwelling places. The annual revenue at that time was about 175,000l. which, according to the Abbé Raynal, must have increased one-eighth yearly for some time. It was taken by the British fleet under admirals Byron and Barrington, in the year 1778; but was restored to France at the peace of 1783. It fell again into the hands of the British in 1794, was evacuated in 1795, and was again retaken in 1796.

The soil of St. Lucia is tolerably good, even at the sea side; and is much better the farther one advances into the country. The whole of it is capable of cultivation, except some high and craggy mountains which bear evident marks of old volcanoes.

Lucia (St.), a high and mountainous island of Africa, and one of those of Cape Verde, is about nine leagues long, and lies in the latitude of 16. 18 N. according to the English geographers, but according to all others it is a degree further to the northward. On the east-south-east side is a harbour, with a bottom and shore of white sand; but its best road is opposite to St. Vincent's to the south-west, where there are at least 20 fathoms of water. On the west side there is no water: it abounds with goats, sea and land fowl, tortoises, &c. but whether it hath any inhabitants is not certainly known.

LUCIANUS, a celebrated writer of Samosata, a town of Syria. His father was poor, and Lucian was early bound to his uncle, who was a sculptor. He made no proficiency in the art, and resolved to seek his livelihood by better means. A dream, in which learning seemed to promise fame and immortality, confirmed his resolutions, and he began to write. The unfair dealings of a lawyer, a life which he had embraced, disgusted him, and he began to study philosophy and eloquence. He visited different places, and more particularly Athens. The emperor M. Aurius was sensible of his

merit, and appointed him register to the Roman governor of Egypt. He died A. D. 180, in his 90th year. The works of Lucian consisted partly of dialogues, in which he introduces different characters with much dramatic propriety. His style is easy, simple, elegant, and animated, and he has stored his compositions with many lively sentiments, and much of the true Attic wit. His exposing to ridicule not only the religion of his country, but also that of every nation, has branded him with the appellation of atheist. Yet we demur at the justice of the charge. Lucian, it is true, ridicules hypocrites, worldly minded-philosophers, sophists, and superstition of every kind: he has rendered the gods of the pagans despicable, and their service odious; but he nowhere speaks against the being or providence of the true God. With more excuse for his irreligion, he was among the Greeks what Voltaire was among the Papists. The Editio Princeps was printed at Florence in 1496; it is of exceeding rarity and value. The second of the Aldine editions, printed in 1522, is valuable, and has served as the basis of many subsequent editions. The Amsterdam edition of 1743, in 4to, by Hemsterhusius, J. M. Gesner, and Reitzius, is not only the most beautiful, but the most accurate and complete edition of Lucian which has yet been published.

LU'CID. *a.* (*lucidus*, Latin.) 1. Shining, bright; glittering (*Newton*). 2. Pellucid; transparent (*Milton*). 3. Bright with the radiance of intellect; not darkened with madness (*Bentley*).

LUCID, in botany, applied to the leaf. Quasi illuminatum. Delin. Pl.—Bright shining, as it were illuminated. Dr. Berkenhout understands it to mean clear, transparent: and Dr. Withering uses the word transparent for it.

LUCI'DITY. *s.* (from *lucid.*) Splendour; brightness.

LUCIFER, in astronomy and mythology, a name given to the planet Venus, when she appears in the morning before sun-rise.

LUCIFERA, in mythology, a surname given to Diana, under which title she was invoked by the Greeks in child-bed. She was represented as covered with a large veil, interspersed with stars, bearing a crescent on her head, and holding in her hand a lighted flambeau.

LUCIFERIANS, a religious sect, who adhered to the schism of Lucifer, bishop of Cagliari, in the fourth century, who was banished by the emperor Constantius, for having defended the Nicene doctrine concerning three persons in the godhead.

St. Augustine seems to intimate, that they believed the soul, which they considered as of a carnal nature, to be transmitted to the children from their fathers. Theodoret says, that Lucifer was the author of a new error. The Luciferians increased mightily in Gaul, Spain, Egypt, &c. The occasion of the schism was, that Lucifer would not allow any acts he had done to be abolished. There were but two Luciferian bishops, but a great number of priests and deacons. The Luciferians bore a peculiar aversion to the Arians.

LUCI'FEROUS. *a.* (*lucifer*, Latin.) Giving light; affording means of discovery (*Boyle*).

LUCI'FIC. *a.* (*lux* and *facio*, Lat.) Making light; producing light (*Grew*).

LUCIOLE, a name sometimes given to the lampyris italica. See LUMINOUS ANIMALS.

LUCILIUS, (C.) a Roman knight born at Arunca, lived in the greatest intimacy with Scipio the first Africanus. He is looked upon as the founder of satire, or first satirical writer among the Romans. He was superior to his poetical predecessors at Rome, and though he wrote with great roughness, but much facility, he gained many admirers. Horace compares him to a river which rolls upon its waters precious sand, with much dirt and filth. Of the thirty satires which he wrote, nothing but a few verses remain. He died at Naples, in the 46th year of his age, B.C. 103.—2. Lucinus, a famous Roman who fled with Brutus after the battle of Philippi. He was taken, and carried to the conquerors, whose clemency spared his life. (*Plut.*)—There were also other Romans of this name, but of inferior note.

LUCILLA, a daughter of M. Aurelius, celebrated for the virtues of her youth, her beauty, and afterwards for her debaucheries and misfortunes. She was put to death for conspiring against her brother Commodus and many of the senators, in the 38th year of her age.

LUCINA, a goddess, daughter of Jupiter and Juno, presided over the birth of children. According to Ovid, she derives her name either from *lucus* or *lux*. Some suppose her to be the same as Diana and Juno, because these two goddesses presided over the labours of women. She is called Ilithya by the Greeks. She had a famous temple at Rome.

LUCIUS, a *prænomen* common to many Romans, of whom an account is given under their family names. The most remarkable of those who bore Lucius as a *nomen* is a writer, born in Africa, on the borders of Numidia. He studied poetry, music, geometry, &c. at Athens, and warmly embraced the tenets of the Platonists. He wrote in Greek and Latin with great ease and simplicity; but his style is sometimes affected. He flourished in the reign of M. Aurelius.

LUCIUS, in ichthyology. See ESOX.

LUCK. *s.* (*geluck*, Dutch.) 1. Chance; accident; hap; casual event (*Boy.*) 2. Fortune, good or bad (*Temple.*)

LU'CKILY. *ad.* (from *lucky.*) Fortunately; by good hap (*Addison.*)

LU'CKINESS. *s.* (from *lucky.*) Good fortune; good hap; casual happiness (*Locke.*)

LU'CKLESS. *a.* (from *luck.*) Unfortunate; unhappy (*Suckling.*)

LUCKNOW, an ancient and extensive city of Hindustan Proper, capital of Oude. It is

meanly built; the houses are chiefly mud walls, covered with thatch; many are entirely of mats and bamboos, thatched with leaves of the cocoa-nut, palm-tree, and sometimes with straw; and very few are built with brick: the streets are crooked, narrow, and worse than most in India. In the dry season, the dust and heat are intolerable; in the rainy season, the mire is so deep as to be scarcely passable; and there is a great number of elephants, belonging to the nabob and the great men of his court, which are continually passing the streets, either to the palace or to the river, to the great danger and annoyance of the foot passenger, as well as the inferior class of shopkeepers. The comforts, conveniency, or property of this class of people are, indeed, little attended to, either by the great men or their servants, the elephant itself being frequently known to be infinitely more attentive to them as he passes, and to children in particular. The palace of the nabob is situated on a high bank near the Goomty, and commands an extensive view both of that river and the country on the eastern side. Lucknow is 605 miles N.W. of Calcutta. Lon. 81. 25 E. Lat. 26. 35 N.

LUCKO, a town of Poland, capital of Volhynia, with a citadel and a bishop's see, seated on the Ster, 75 miles N. E. of Lemburg, and 175 S.E. of Warsaw. Lon. 25. 30 E. Lat. 51. 13 N.

LU'CKY. *a.* (from *luck*; *geluckig*, Dutch.) Fortunate; happy by chance (*Addison*).

LUCON, or LUZON, a town of France, in the department of Vendée, and late province of Poitou, and lately an episcopal see. It is seated in an unwholesome morass, 17 miles N. of Rochelle, and 50 S. of Nantes. Lon. 1. 5 W. Lat. 46. 27 N.

LUCONIA, or LUCON, the chief of the Philippine Islands, in the N. Pacific Ocean, 400 miles in length, and 100 in breadth. It is not so hot as might be expected, because it is well watered by large lakes and rivers, and the periodical rains, which inundate all the plains. There are several volcanoes in the mountains, which occasion earthquakes; and a variety of hot baths. The produce of this island is wax, cotton, silk, wild cinnamon, sulphur, cocoa nuts, rice, gold, horses, buffaloes, and game. Philip II. of Spain formed a scheme of planting a colony in the Philippine Islands, which had been neglected since the discovery of them by Magellan, in 1521. Manilla, in this island, was the station chosen for the capital of the new establishment. Hence an active commercial intercourse began with the Chinese, a considerable number of whom settled in the Philippine Islands, under the Spanish protection. These supplied the colony so amply with all the valuable productions and manufactures of Asia, as enabled it to open a trade with America, by a direct course of navigation, the longest from land to land on the globe. This trade, at first, was carried on with Callao on the coast of Peru; but it was afterward removed to Acapulco, on the coast of New Spain. From this port annually sail one or two ships, which are permitted to carry out silver to the amount of 500,000 crowns, in return for which they bring back from Manilla spices, drugs, China and Japan wares, callicoes, chintz, muslins, silks, &c. The inhabitants are a mixture of several nations, beside Spaniards, and they all produce a mixed breed, distinct from any of the rest. The blacks have long hair, and good features; and there is one tribe who prick their skins, and draw figures on them, as they do in most other countries where they go naked.

LU'CRATIVE *a.* (*lucrativus*, Lat.) Gainful; profitable; bringing money (*Bacon*).

LU'CRE. *s.* (*lucrum*, Latin.) Gain; profit; pecuniary advantage (*Pope*).

LUCRETIA, a celebrated Roman lady, daughter of Lucretius, and wife of Tarquinius Collatinus. Her accomplishments proved fatal to her. A conversation having arisen among some young noblemen at Ardea, concerning the virtue of their wives, it was agreed to go to Rome, and ascertain the truth of their respective assertions. The sons of Tarquinius Superbus, and Collatinus, were of the number. On their arrival at Rome, Collatinus had the pleasure to see his expectations fulfilled in the highest degree, and while the wives of the other Romans were involved in the riot of a feast, Lucretia was found at home, employed in the midst of her female servants, and easing their labour by sharing it herself. The beauty and innocence of Lucretia inflamed the passion of Sextus the son of Tarquin, who was a witness of her virtues and industry. He cherished his flame, and he secretly retired from the camp, and came to the house of Lucretia, where he met with a kind reception. In the dead of night he introduced himself to Lucretia, who yielded only when he threatened to murder her, and to slay one of her slaves, and put him in her bed. Lucretia, on the following day, revealed to her father and husband, whom she had sent for to the camp, the indignities she had suffered from the son of Tarquin, entreated them to avenge her wrongs, and then stabbed herself with a dagger, which she had previously concealed under her cloaths. The body of the virtuous Lucretia was then exposed to the eyes of the senate, and the barbarity of Sextus, joined with the oppression of his father, so irritated the Roman populace, that that moment they expelled the Tarquins for ever from Rome. A. U. C. 244.

LUCRETILIS, a mountain in the country of the Sabines, hanging over a pleasant valley, near which the house of Horace was situate.

LUCRETIUS, or TITUS LUCRETIUS CARUS, one of the most celebrated of the Roman poets and philosophers, was born of an ancient and noble family at Rome, in the year before Christ 90. He studied at Athens, where he adopted the philosophy of the Epicureans. When he was about 40 years of age he put an end to his own existence in the delirium of a fever. The story of that fatal derangement having been produced by a phil-

tre, administered to him by his fond wife, is one which we are not at all inclined to admit.

His celebrated poem *De Natura Rerum*, though among the earliest classics given to the world by the invention of printing, though published by many successive editors, and though translated into all the modern languages of Europe has not till very recently been purified with the desired success from innumerable corrupt readings, which had accumulated through time and ignorance, to the obscurity and essential injury of the text. This was the more to be lamented, since the originality and superlative beauty of this poet are not the only attractions he possesses. It is a fact no less remarkable than true, that the inductive method of Bacon, part of the sublime physics of Newton, and various of the chemical discoveries of our own days, were to a surprising degree anticipated, as to their principles and many important results, by the philosophical poet of Rome.

The principal editions of Lucretius are:

| | | | |
|---|---|---|---|
| Ferrandus | Brixiæ | fol. | |
| Fridenberger | Veronæ | fol. | 1486. |
| Aldus | Venet. | 4to. | 1500. |
| Ibid | Ibid | 8vo. | 1515. |
| Baptistæ Pii | Bonon. | fol. | 1511,&c. |
| Lambini | Paris | 4to. | 1563,&c. |
| Ibid | Ibid | 8vo. | 1565,&c. |
| Gisanii, | Antwerp | 8vo. | 1563,&c. |
| Ibid | Lug. Bat. | 8vo. | 1595. |
| Fabri | Salmur | 4to. | 1662. |
| Creechii | Oxon | 8vo. | 1695. |
| Tonson | Lond. | fol. | 1712. |
| Havercampi | Lug. Bat. | 4to. | 1725. |
| ——— | Bipont | 8vo. | 1782. |
| Wakefieldi | Lond. | 4to. | 1796. |
| Eichstadtii | Lipsiæ | 8vo. | 1801. |

Of these editions we would particularly specify those of Tonson, Havercamp, and Wakefield. The latter is a very beautiful and correct work, in 3 vols. 4to. The small paper copies sold at 5*l*. 5*s*. and the large paper, of which only 50 copies were taken off for subscribers, at 20*l*. each. This is now an extremely scarce work; as the principal part of the edition was consumed by a fire which destroyed the premises of Mr. Hamilton the printer. This circumstance greatly enhances the value of the new translation of Lucretius by Mr. Good, published in 2 vols. 4to, in 1805; for in this edition the translator has printed the Latin text of his author from Wakefield's edition, on corresponding pages to his version. Mr. Good has farther enriched his work with an interesting preface and many valuable notes. He gives a critical account of the principal editions and translations of his author, a copious history of Lucretius, a sensible vindication of his character and philosophy from vulgar misrepresentation; and what is of still more value, in our estimation, he has "given a comparative statement of the rival systems of philosophy that flourished in Lucretius's time; has followed them in their ebbs and flows, through succeeding generations, and identified their connexion with various theories of the present day."

LUCRI'FEROUS. *a.* (*lucrum* and *fero*, Lat.) Gainful; profitable (*Boyle*).

LUCRI'FIC. *a.* (*lucrum* and *facio*, Latin.) Producing gain.

LUCRINUS, in ancient geography, a small lake of Campania opposite Puteoli, remarkable for excellent oysters. Since the earthquake in 1538, this has been a perfect bay.

LUCTA'TION. *s.* (*luctor*, Lat.) Struggle; effort; contest.

*To* LU'CUBRATE. *v. n.* (*lucubror*, Latin.) To watch; to study by night.

LUCUBRA'TION. *s.* (*lucubratio*, Latin.) Study by candlelight; nocturnal study; any thing composed by night (*Tatler*).

LUCUBRA'TORY *a.* (*lucubratorius*, Lat.) Composed by candlelight (*Pope*).

LU'CULENT. (*lucullentus*, Latin.) 1. Clear; transparent; lucid (*Thomson*). 2. Certain; evident (*Hooker*).

LUCULLI VILLA, a country seat of Lucullus, near mount Misenus, where Tiberius died.

LUCULLUS (Lucius Licinius), a Roman celebrated for his luxury and for his military talents. He was born about 115 years B. C. His first campaign was in the Marsian war, where his valour recommended him to public notice. His constancy gained him the confidence of Sylla. During his quæstorship in Asia, and pretorship in Africa, he rendered himself more conspicuous by his justice and humanity. He was raised to the consulship A. U. C. 678, and entrusted with the care of the Mithridatic war. He first rescued his colleague Cotta, besieged in Chalcedonia, and next gained a celebrated victory over Mithridates, on the borders of the Granicus. His victories by sea were as great as those by land, and Mithridates lost a powerful fleet near Lemnos. Mithridates fled towards Armenia to Tigranes, his father-in-law. Lucullus crossed the Euphrates in pursuit of him, and according to Plutarch defeated the forces of Tigranes, with the loss of 100,000 foot and 55,000 horse. All this carnage was made by a Roman army, amounting to no more than 18,000 men, of whom only five were killed and 100 wounded during the combat. The taking of Triganocerta, the capital of Armenia, was the consequence of his immortal victory. The severity of Lucullus, however, soon offended his soldiers, and displeased his adherents at Rome, and Pompey was sent to succeed him. Lucullus was permitted to return to Rome, where he with difficulty obtained a triumph, which his victories deservedly claimed. In this ended his days of glory; he retired to the enjoyment of ease and peaceful society, fell into a delirium in the last part of his life, and died in the 67th or 68th year of his age. Lucullus has been admired for his many accomplishments, but he has been censured for his severity and extravagance. (*Plut. Flor.* &c.)

There were other Romans of this name re-

corded by ancient historians, but of inferior note.

LUCUS, in general denotes a wood or grove sacred to a deity; so called *a lucendo*, because a great number of lights were usually burning in honour of the god (Isidorus); a practice common with idolaters, as we learn from Scripture: hence Homer's αγλαον αλσος.

LUD, a British king mentioned in our old chronicles, and said to have reigned about the year of the world 3878. He is reported to have enlarged and walled about Troynovant, or New Troy, where he kept his court, and made it his capital. The name of London is hence by some derived from Lud's town; and Ludgate, from his being buried near it: but this is only one among many other derivations of the name of London; which are at least equally probable. See London.

LUDI, a term used for shows and public representations made by the Romans for the entertainment of the people. (See Games.) For an account of the particular games of Greece and Rome, as the Isthmian, Nemæan, Olympic, &c. see Isthmian, &c.

LUDIA, in botany, a genus of the class polyandria, order monogynia. Calyx from four to seven parted; corolless; style three or four-cleft: berry dry, one-celled, many-seeded. Three species: shrubs of the Mauritius.

LU'DICROUS. *a.* (*ludicer*, Latin.) Burlesque; merry; sportive; exciting laughter (*Broome*).

LU'DICROUSLY. *ad.* (from *ludicrous*.) Sportively; in burlesque.

LU'DICROUSNESS *s.* (from *ludicrous*.) Burlesque; sportiveness.

LUDIFICA'TION. *s.* (*ludificor*, Latin.) The art of mocking.

LUDIUS, a celebrated painter, lived in the reign of Augustus Cæsar, and excelled in grand compositions. He was the first who painted the fronts of houses in the streets of Rome, which he beautified with great variety of landscapes, and many other different subjects.

LUDLOW, a town of England, in the county of Salop, situated on the Temde, first incorporated by Edward VI. in whose reign it first sent members to the British parliament. Here are considerable remains of a castle, erected by Roger de Montgomery, soon after the conquest. Edward V. resided here at the death of his father, and was carried from hence to London. Arthur, prince of Wales, son of Henry VII, held a court, and died here. This castle and town were held for the empress Maud against king Stephen, and besieged by him. The castle is now annexed to the principality of Wales. The town is divided into four wards, and has seven gates in the walls: twenty-nine miles S. Shrewsbury, and 142 W.N.W. London. Lon. 2. 42 W Lat. 52. 23 N.

LUDOLPH (Job), a very learned writer of the 17th century, was born at Erfurt in Thuringia. He travelled much, and was master of 25 languages; visited libraries, searched after natural curiosities and antiquities every where, and conversed with learned men of all nations. He published a history of Ethiopia, and other curious books.

Ludolph (Henry William), nephew of Job above mentioned, was born at Erfurt in 1655. He came over to England as secretary to M. Lenthe, envoy from the court of Copenhagen to that of London; and being recommended to prince George of Denmark, was received as his secretary. He enjoyed this office for some years, until he was incapacitated by a violent disorder; when he was discharged with a handsome pension: after he recovered, he travelled into Muscovy, where he was well received by the czar, and where his knowledge made the Muscovite priests suppose him to be a conjuror. On his return to London in 1694, he was cut for the stone; and as soon as his health would permit, in acknowledgement of the civilities he had received in Muscovy, he wrote a grammar of their language, that the natives might learn their own tongue in a regular method. He then travelled into the East, to inform himself of the state of the Christian church in the Levant; the deplorable condition of which induced him, after his return, with the aid of the bishop of Worcester, to print an edition of the New Testament in the vulgar Greek, to present to the Greek church. In 1709, when such numbers of Palatines came over to England, Mr. Ludolph was appointed by queen Anne one of the commissioners to manage the charities raised for them; and he died early the following year. His collected works were published in 1712.

LUDWIGIA, a genus of the monogynia order, in the tetrandria class of plants, and in the natural method ranking under the 17th order, calycanthemæ. The corolla is tetrapetalous; the calyx quadripartite, superior; the capsule tetragonal, quadrilocular, inferior, and polyspermous. There are four species, annuals of the West Indies.

LUDWIGSBURG, a town of Suabia, in the duchy of Wurtemburg, with manufactures of cloth, damask linen, and marble paper. Here is a fine hunting seat belonging to the duke of Wurtemberg, called La Favorita. It is five miles N.N.E. of Stutgard.

Ludwigsburg, a town of Upper Saxony, in Anterior Pomerania, five miles E.N.E. of Griessewalde.

LUES VENERIA. (*lues*, from λυω, to dissolve, because it produces dissolution). The venereal disease. See Syphilis and Gonorrhœa.

*To* LUFF. *v. n.* (or *loof*). To keep close to the wind. Sea term (*Dryden*).

*To* LUG. *v. a.* (aluccan, Saxon, to pull) 1. To haul or drag; to pull with rugged violence (*Collier*). 2. *To* Lug *out*. To draw a sword, in burlesque language (*Dryden*).

*To* Lug. *v. n.* To drag; to come heavily.

Lug. *s.* 1. A kind of worm (See Lumbricus.) 2. (In Scotland.) An ear. 3. A land measure; a pole or perch (*Spenser*).

LUGA, a town of Russia, in the govern-

ment of Petersburg, situate on a river of the same name, 80 miles S. of Petersburg. Lon. 29. 39 E. Lat. 51. 49 N.

LUGANO, a town of Swisserland, capital of a bailiwic of the same name, which is the principal of the four transalpine bailiwics. It is built round a gentle curve of the lake of Lugano and backed by an amphitheatre of hills. It is the emporium of the greatest part of the merchandise which passes from Italy over the St. Gothard, or the Bernardin. It contains 8000 inhabitants; and on an eminence above the town is the principal church, which has a delightful prospect from its terrace. Most of the houses are built of turfstone; and the residence of the governor is a low building, on the walls of which are the arms of 12 cantons to which this bailiwic is subject; for the canton of Appenzel has no jurisdiction over it. It is 17 miles N.W. of Como. Lon. 8. 48 E. Lat. 45. 54 N.

LUGANO, a lake of Swisserland on the Italian side of the Alps, it is 25 miles in length, and from two to four in breadth; its form is irregular, and bending into continual sinuosities. It lies about 190 feet higher than the lakes Como and Locarno.

LUDGE, or LUDE, a town of Westphalia, in the bishopric of Paderborn, situate on the Emmer, 24 miles N.N.E. of Paderborn. Lon. 8. 39 E. Lat. 51. 49 N.

LUGDUNENSIS GALLIA, a part of Gaul whith receives its name from Yugdunum, the capital city of the province. (See GALLIA.)

LUGDUNUM, a town of Gallia Celtica, built at the confluence of the Rhone and the Arar, or Saone, by Manutius Plancus, when governor of the province. This town, now called Lyons, is the second city of France in point of population. (*Strab.*)—2. Batavorum, a town on the Rhine, now called Leyden.

LUGEUS LACUS, the ancient name of what is now called the Zirchnich Lake.

L'UGGAGE. *s.* (from *lug.*) any thing cumbrous and unwieldy that is to be carried away (*Glanville*).

LUGU'BRIOUS. *a.* (*lugubre*, French; *lugubris*, Latin) Mournful; sorrowful; (*Decay of Piety*).

LUGO, an ancient city of Spain, in Galicia, with a bishop's see. There are springs in this city boiling hot. It is seated on the Minho, 32 miles S.E. of Mondonnedo, and 60 S.W. of Oviedo. Lon. 8. 52 W, lat. 42. 46 N.

LUHEA, in botany, a genus of the class polyadelphia, order polyandria. Calyx double; the outer one nine-leaved, inner one five parted; petals five; nectaries five, pencil-form; style solitary. One species: a tree of the Caraccas with white flowers, in terminal few-flowered racemes.

LUJULA. (*lujula*, corrupted or contracted from *allelujah*, praise the Lord; so called from its many virtues). Acetosella. Wood-sorrel. Oxalis acetosella of Linnæus. This delicate indigenous plant is totally inodorous, but has a grateful acid taste, which is more agreeable than the common sorrel, and approaches nearly to that of the juice of lemons, or the acid of tartar, with which it also corresponds in a great measure in its medical effects, being esteemed refrigerant, antiscorbutic, and diuretic. Its principal use, however, is to allay inordinate heat, and to quench thirst; for this purpose a pleasant whey may be formed by boiling the plant in milk. An essential salt is prepared from this plant known by the name of essential salt of lemons, and commonly used for taking-ink stains out of linen. Its acid is also crystallized and sold under the name of crystallized lemon-juice.

LUKE (St.), the evangelist, and the disciple of the Apostles, was originally of Antioch in Syria, and by profession a physician. He particularly attached himself to St. Paul, and was his faithful companion in his travels and labours. He went with him to Troas in Macedonia about the year 51. He wrote his gospel in Achaia about the year 53; and ten years after, the Acts of the Apostles, which contains a history of 30 years. Of all the inspired writers of the New Testament, his works are written in the most elegant Greek. It is believed that St. Luke died at Rome, or in Achaia. St. Jerome says he died at the age of 83.

LUKE'S GOSPEL, a canonical book of the New Testament. Some think it was properly St. Paul's gospel, and that when that apostle speaks of his gospel, he means what is called St. Luke's. Irenæus says, that St. Luke digested into writing what St. Paul preached to the Gentiles; and Gregory Nazianzen tells us that St. Luke wrote with the assistance of St. Paul. This Gospel as well as the Acts of the Apostles, written by this evangelist, are supposed to have been two parts of the same volume, and to have been published in the year of Christ 63, or 64, as some say in Alexandria, but according to others, in Greece.

St. Luke, says a modern writer, is pure, copious, and flowing in his language, and has a wonderful and entertaining variety of select circumstances in his narration of our Saviour's divine actions. He acquaints us with numerous passages of the evangelical history, not related by any other evangelist: both in this gospel and Apostolical Acts, he is accurate and neat, clear and flowing with a natural and easy grace: his style is admirably accommodated to the design of history; it had a very considerable resemblance to that of his great master St. Paul; and like him, he had a learned and liberal education, and appears so have been very conversant with the best classics; for many of his words and expressions are exactly parallel to their's.—*Blackwall's Sacred Classics.*

LUKE'S DAY (St.), a festival of the church observed on the 18th of October.

LU'KEWARM, *a.* 1. Moderately or mildly warm (*Newton*). 2. Indifferent; not ardent; not zealous (*Addison*).

LU'KEWARMLY. *ad.* 1. With moderate warmth; 2. with indifference.

LU'KEWARMNESS. *s.* (from *lukewarm.*) 1. Moderate or pleasing heat. 2. Indifference, want of ardour (*Sprat*).

LULA, a town of Swedish Lapland, at the mouth of the Lula, on the west side of the gulf of Bothnia, 42 miles south-west of Tornea. Lon. 22. 10. E. Lat. 65. 29. N.

*To* LULL, *v. a.* (*lulu*, Danish; *lullo*, Lat.) 1. To compose to sleep by a pleasing sound (*Spenser*). 2. To compose; to quiet; to put to rest (*Milton*).

LU'LLABY. s. (from *lull.*) A song to still babes (*Fairfax. Locke*).

LULLE, or Lully (Raymond), called also, according to the custom of the age in which he lived, the *Illuminated Doctor*; was a native of Majorca. He devoted himself to missionary labours, and was stoned to death in Maritania in 1315, at the age of 80. His works, treating of all kinds of subjects, theological, physical, and chemical, have been often printed.

LULLI (John Baptist), a celebrated musician, was born at Florence in 1634. He was page to Madame de Montpensier, niece of Louis XIV. who caused him to be taught music. He acquired such excellence as to become superintendant of music to that king. He died of a gangrene in his foot in 1687. He composed a number of operas, and the music of several of Moliere's plays.

LUMBA'GO, (*Lumbago, inis*, f. from *lumbus*, the loin. A rheumatic affection of the muscles about the loins.

LUMBA'RIS Externus. See Quadratus Lumborum.

Lumba'ris Internus. See Psoas magnus.

LU'MBER. *s.* (zeloma, Saxon, household-stuff.) Any thing useless or cumbersome; any thing of more bulk than value (*Dryden*).

*To* Lu'mber. *v. a.* (from the noun.) To heap like useless goods irregularly (*Rymer*).

*To* Lu'mber. *v. n.* To move heavily, as burdened with his own bulk (*Dryden*).

LUMBRICALES Manus, (*Lumbricales*, sc. *musculus*, from their resemblance to the *lumbricus*, or earth-worm.) *Fidicinales*. The four small flexor muscles of the fingers which assist their bending when the long flexors are in full action. They arise thin and fleshy from the outside of the tendons of the flexor profundus, a little above the lower edge of the carpal ligaments, and are inserted by long slender tendons into the outer sides of the broad tendons of the interosseal muscles about the middle of the first joint of the fingers.

Lumbricale Pedis. Four muscles like the former, that increase the flexion of the toes, and draw them inwards.

LU'MBRICUS, or Lumbricus Teres, a common name among medical writers for the ascaris lumbricoides. See Acaris.

Lu'mbricus. Earth-worm. In zoology, a genus of the class vermes; order intestina. Body round, annulate, with generally an elevated fleshy belt near the head, mostly rough with minute concealed prickles, placed longitudinally, and furnished with a lateral aperture. Sixteen species—of which three or four are natives of Great Britain. The following are those most worthy of notice:

1. L. Terrestris. Dew-worm. Body red, with eight rows of prickles. Another variety much smaller. The body contains about one hundred and forty rings, each of which has about four pair of prickles, not visible to the eye, but discoverable by the touch: when expanded is convex on each side, and when contracted is flattish beneath, with a red canal down the whole body. The belt is wrinkled and porous; mouth placed beneath the proboscis. Inhabits decayed wood, and the common soil, which, by perforating, it renders fit to receive the rain; devours the cotyledons of plants, and wanders about by night; is the food of moles, hedgehogs, and various birds.

2. L. marinus. Lug. Back with two rows of bristly tubercles. Body pale red, round and annulate, with greater or less rings; the first prominent with two opposite tufts of short bristles on each; the lower part smooth. Inhabits the shores of England and other parts of Europe; where it buries itself in the sand, leaving a little rising with an aperture on the surface; and is used as a bait for fishes.

3. L. variegatus. Rufous, spotted, with six rows of prickles. Inhabits wet plantations, and is the most beautiful of its kind; body red, very finely tesselate with brown, with a sanguineous line running down the whole body; it easily breaks in pieces, and as easily reproduces what has been lost.

4. L. Tubifex. Body reddish, with two rows of prickles—pellucid. Inhabits the bottom of rivulets, where it forms a perpendicular tube of earth for its dwelling.

LUMBUS Veneris. See Millefolium.

LUMELLO, a town of Italy, in the Milanese, which gives name to a district called the Lumelline. It was formerly the residence of the kings of Lombardy, and is situate on the Gognia, 26 miles south-west of Milan, and 44 east-north-east of Turin. Lon. 9. 29. E. Lat. 45. 15. N.

LU'MINARY. *s.* (*luminare*, Latin.) 1. Any body which gives light (*Milton*). 2. Any thing which gives intelligence (*Wotton*). 3. Any one that instructs mankind (*Bentley*).

LUMINA'TION. *s.* (from *lumin*, Latin.) Emission of light.

LU'MINOUS. *a.* (*lumineux*, French.) 1. Shining; emitting light (*Bacon*). 2. Enlightened (*Milton*). 3. Shining; bright (*Newton*).

LUMINOUS SUBSTANCES, *Animal and Vegetable.* It is a curious fact, and though occasionally noticed, not generally attended to till of late years, that various animal and vegetable substances have a power of throwing forth light under particular circumstances; some of them while living, and others not till after death. We shall first notice the general history of this ex-

traordinary fact, and the observations upon it which first suggested themselves to those who remarked and examined it, and afterwards glance at a few of the numerous modes by which it has of late years been attempted to be accounted for.

*General History, and earliest Notices.*

That light occasionally proceeds from putrescent animal and vegetable substances as well as from living glow-worms was noticed by Aristotle. Columba, an industrious naturalist, observed long after that several insects emitted light, and that such light is not extinguished immediately upon the death of the animal. But the first distinct account that we meet with of light proceeding from putrescent animal flesh, is that which is given by Fabricius ab Aquapendente, (De Visione, p. 45.) who says, that when three Roman youths, residing at Padua, had bought a lamb, and had eaten part of it on Easter-day 1592, several pieces of the remainder, which they kept till the day following, shone like so many candles when they were casually viewed in the dark. Part of this luminous flesh was immediately sent to Aquapendente, who was professor of anatomy in that city. He observed, that both the lean and the fat of this meat shone with a whitish kind of light; and also took notice, that some pieces of kid's flesh, which had happened to have lain in contact with it, were luminous, as well as the fingers and other parts of the bodies of those persons who touched it. Those parts, he observed, shone the most which were soft to the touch, and seemed to be transparent in candle-light; but where the flesh was thick and solid, or where a bone was near the outside, it did not shine.

From this period we must descend to the era of Thomas Bartholin, before we meet with any similar notice. This writer, in a distinct treatise *de luce* animalium (p. 183, 206) mentions four kinds of luminous insects, two of which were possessed of wings, and two wingless, or apterous. He also takes notice of one instance in which light was observed to issue from dead matter. This happened at Montpelier in 1641, when a poor old woman had bought a piece of flesh in the market, intending to make use of it the day following. But happening not be able to sleep well that night, and her bed and pantry being in the same room, she observed so much light come from the flesh, as to illuminate all the place where it hung. A part of this luminous flesh was carried as a curiosity to Henry Bourbon, duke of Condè, the governor of the place, who viewed it for several hours with the greatest astonishment.

This light was observed to be whitish; and not to cover the whole surface of the flesh, but certain parts only, as if gems of unequal splendour had been scattered over it. This flesh was kept till it began to putrify, when the light vanished; which, as some religious people fancied, it did in the form of a cross.

Boyle tried the effect of his air-pump upon these luminous substances; and found that the light of rotten wood was extinguished in vacuo, and revived again on the admission of the air, even after a long continuance in vacuo; but the extinguishing of this light was not so complete immediately upon exhausting the receiver, as some little time afterwards. He could not perceive, however, that the light of rotten wood was increased in condensed air; but this, he imagined, might arise from his not being able to judge very well of the degree of light, through so thick and cloudy a glass vessel as he then made use of; but we find that the light of a shining fish, which was put into a condensing engine before the Royal Society, in 1668, was rendered more vivid by that means. The principal of Mr. Boyle's experiments were made in October 1667.

This philosopher attended to a great variety of circumstances relating to this curious phenomenon. Among other things he observed, that change of air was not necessary to the maintenance of this light; for it continued a long time when a piece of the wood was put into a very small glass hermetically sealed, and it made no difference when this tube which contained the wood was put into an exhausted receiver. This he also observed with respect to a luminous fish, which he put into water, and placed in the same circumstances. He also found, that the light of shining fishes had other properties in common with that of shining wood; but the latter, he says, was presently quenched with water, spirit of wine, a great variety of saline mixtures, and other fluids. Water, however, did not quench all the light of some shining veal on which he tried it, though spirit of wine destroyed its virtue presently.

Mr. Boyle's observation of light proceeding from flesh-meat was quite casual. On the 15th of February 1662, one of his servants was greatly alarmed with the shining of some veal, which had been kept a few days, but had no bad smell, and was in a state very proper for use. The servant immediately made his master acquainted with this extraordinary appearance; and though he was then in bed, he ordered it to be immediately brought to him, and he examined it with the greatest attention. Suspecting that the state of the atmosphere had some share in the production of this phenomenon, he takes notice, after describing the appearance, that the wind was south-west and blustering, the air hot for the season, the moon was past its last quarter, and the mercury in the barometer was at $29\frac{3}{16}$ inches.

Mr. Boyle was often disappointed in his experiments on shining fishes; finding that they did not always shine in the very same circumstances, as far as he could judge, with others which had shined before. At one time that they failed to shine, according to his expectations, he observed that the weather was variable, and not without some days of frost and snow. In general he made use of whitings, finding them the fittest for his purpose. In a discourse, however, upon this subject at the Royal Society in 1681, it was asserted, that, of all fishy substances, the eggs of lobsters, after they had been boiled, shone the brightest. Olig. Jacobæus observes, (Act. Hafn, vol. v. p. 282.) that, upening a sea-polypus, it was so luminous as to startle several persons who saw it; and he says, (but incorrectly according to later experiments) that the more putrid the fish was, the more luminous it grew. The nails also, and the fingers of the persons who touched it, became luminous; and the black liquor which issued from the animal, and which is its bile, shone also, but with a very faint light.

Mr. Boyle draws a minute comparison between the light of burning coals and that of shining wood or fish, showing in what particulars they agree, and in what they differ. Among other

things he observes, that extreme cold extinguishes the light of shining wood, as appeared when a piece of it was put into a glass tube, and held in a frigorific mixture, a fact which minutely agrees with Dr. Holmes' more modern experiments upon dead animal matter. He also found that rotten wood did not waste itself by shining, and that the application of a thermometer to it did not discover the least degree of heat.

The shell-fish called pholas, or phloas, which forms for itself holes in various kinds of stone, &c. was one of the earliest subjects of attention. That this fish is luminous was noticed by Pliny; who observes, that it shines in the mouth of the person who eats it, and, if it touch his hands or clothes, makes them luminous. He also says, that the light depends upon its moisture.

Reaumur observes, that, while other fishes give light when they tend to putrescence, this is more luminous in proportion to its being fresh; that when they are dried, their light will revive if they be moistened either with fresh or salt water, but that brandy immediately extinguishes it. He endeavoured to make this light permanent, but none of his schemes succeeded.

The attention of the Bolognian academicians was engaged to this subject by M. F. Marsilius, in 1724, who brought a number of these fishes, and the stones in which they were inclosed, to Bologna, on purpose for their examination.

Beccarius observed, that though this fish ceased to shine when it became putrid; yet that in its most putrid state, it would shine, and make the water in which it was immersed luminous, when they were agitated. Galeatius and Montius found, that wine or vinegar extinguished this light: that in common oil it continued some days; but in rectified spirit of wine or urine, hardly a minute.

In order to observe in what manner this light was affected by different degrees of heat, they made use of a Reaumur's thermometer, and found that water rendered luminous by these fishes increased in light till the heat arrived to 45 degrees; but that it then became suddenly extinct, and could not be revived.

In the experiments of Beccarius, a solution of sea salt increased the light of the luminous water, a solution of nitre did not increase it quite so much: sal ammoniac diminished it a little: oil of tartar per deliquium nearly extinguished it: and the acids entirely. This water poured upon fresh calcined gypsum, rock crystal, ceruss, or sugar, became more luminous. He also tried the effects of it when poured upon various other substances, but there was nothing very remarkable in them. Afterwards, using luminous milk, he found that oil of vitriol extinguished the light, but that oil of tartar increased it.

This gentleman had the curiosity to try how differently coloured substances were affected by this kind of light; and having, for this purpose, dipped several ribbons in it, the white came out the brightest, next to this was the yellow, and then the green; the other colours could hardly be perceived. It was not, however, any particular colour, but only light that was perceived in this case. He then dipped boards painted with the different colours, and also glass tubes, filled with substances of different colours, in water rendered luminous by the fishes. In both these cases the red was hardly visible, the yellow was the brightest, and the violet the dullest. But on the boards the blue was nearly equal to the yellow, and the green more languid; whereas in the glasses, the blue was inferior to the green.

Of all the liquors into which he put the phloades, milk was rendered the most luminous. A single phloas made seven ounces of milk so luminous, that the faces of persons might be distinguished by it, and it looked as if it was transparent.

Air appeared to be necessary to this light; for when Beccarius put the luminous milk into glass tubes, no agitation would make it shine, unless bubbles of air were mixed with it. Also Montius and Galeatius found, that, in an exhausted receiver, the phloas lost its light, but the water was sometimes made more luminous; which they ascribed to the rising of bubbles of air through it.

Beccarius, as well as Reaumur, had many schemes to render the light of these phloades permanent. For this purpose he kneaded the juice into a kind of paste, with flour, and found that it would give light when it was immersed in warm water; but it answered best to preserve the fish in honey. In any other method of preservation, the property of becoming luminous would not continue longer than six months, but in honey it had lasted above a year; and then it would, when plunged in warm water, give as much light as ever it had done.

Similar, in some respects, to those observations on the light of the phloas, was that which was observed to proceed from wood which was moist, but not in a putrid state, which was very conspicuous in the dark.

That the sea is sometimes luminous, especially when it is put in motion by the dashing of oars or the beating of it against a ship, has been observed with admiration by a great number of persons. Mr. Boyle, after reciting all the circumstances of this appearance, as far as he could collect them from the accounts of navigators; as its being extended as far as the eye could reach, and at other times being visible only when the water was dashed against some other body; that, in some seas, this phenomenon is accompanied by some particular winds, but not in others; and that sometimes one part of the sea will be luminous, when another part, not far from it, will not be so; concludes with saying, that he could not help suspecting that these odd phenomena, belonging to great masses of water, were in some measure owing to some cosmical law or custom of the terrestrial globe, or at least of the planetary vortex.

Some curious observations on the shining of some fishes, and the pickle in which they were immersed, were made by Dr. Beal, in May 1665, and, had they been properly attended to and pursued, might have led to the discovery of the cause of this appearance. Having put some boiled mackarel into water, together with salt and sweet herbs; when the cook was some time after stirring it, in order to take out some of the fishes, she observed, that, at the first motion, the water was very luminous; and that the fish shining through the water added much to the light which the water yielded. The water was of itself thick and blackish, rather than of any other colour; and yet it shined on being stirred, and at the same time the fishes appeared more luminous than the water. Wherever the drops of this water, after it had been stirred, fell to

the ground, they shined; and the children in the family diverted themselves with taking the drops, which were as broad as a penny, and running with them about the house. The cook observed, that when she turned up that side of the fish that was lowest, no light came from it; and that, when the water had settled for some time, it did not shine at all. The day following, the water gave but little light, and only after a brisk agitation, though the fishes continued to shine as well from the inside as the outside, and especially about the throat, and such places as seemed to have been a little broken in the boiling.

When, in the light of the sun, he examined, with a microscope, a small piece of a fish which had shined very much the night before, he found nothing remarkable on its surface, except that he thought he perceived what he calls a steam, rather dark than luminous, arising like a very small dust from the fish, and here and there a very small and almost imperceptible sparkle. Of the sparkles he had no doubt; but he thought it possible that the steam might be a deception of the sight, or some dust in the air.

Finding the fish to be quite dry, he moistened it with his spittle; and then observed that it gave a little light, though but for a short time. The fish at that time was not fetid, nor yet insipid to the best discerning palate. Two of the fishes he kept two or three days longer for farther trial; but the weather being very hot, they became fetid; and, contrary to his expectations, there was no more light produced either by the agitation of the water or in the fish.

Father Bourzes, in his voyage to the Indies in 1704, took particular notice of the luminous appearance of the sea. The light was sometimes so great, that he could easily read the title of a book by it, though he was nine or ten feet from the surface of the water. Sometimes he could easily distinguish, in the wake of the ship, the particles that were luminous from those that were not; and they appeared not to be all of the same figure. Some of them were like points of light, and others such as stars appear to the naked eye. Some of them were like globes, of a line or two in diameter; and others as big as one's head. Sometimes they formed themselves into squares of three or four inches long, and one or two broad. Sometimes all these different figures were visible at the same time; and sometimes there were what he calls vortices of light, which at one particular time appeared and disappeared immediately like flashes of lightning.

Nor did only the wake of the ship produce this light, but fishes also, in swimming, left so luminous a track behind them, that both their size and species might be distinguished by it. When he took some of the water out of the sea, and stirred it ever so little with his hand, in the dark, he always saw in it an infinite number of bright particles; and he had the same appearance whenever he dipped a piece of linen in the sea, and wrung it in a dark place, even though it was half dry; and he observed, that when the sparkles fell upon any thing that was solid, it would continue shining for some hours together.

After mentioning several circumstances which did not contribute to this appearance, this Father observes, that it depends very much upon the quality of the water; and he was pretty sure that this light is the greatest when the water is fattest, and fullest of foam. For in the main sea, he says, the water is not every where equally pure; and that sometimes, if linen be dipped in the sea, it is clammy when it is drawn up again: and he often observed, that when the wake of the ship was the brightest, the water was the most fat and glutinous, and that linen moistened with it produced a great deal of light, if it was stirred or moved briskly. Besides, in some parts of the sea, he saw a substance like saw-dust, sometimes red and sometimes yellow; and when he drew up the water in those places, it was always viscous and glutinous. The sailors told him, that it was the spawn of whales: that there are great quantities of it in the north, and that sometimes, in the night, they appeared all over of a bright light, without being put in motion by any vessel or fish passing by them.

As a confirmation of this conjecture, that the more glutinous the sea water is, the more it is disposed to become luminous, he observes, that one day they took a fish that was called a bonite, the inside of the mouth of which was so luminous, that, without any other light, he could read the same characters which he had before read by the light in the wake of the ship; and the mouth of this fish was full of a viscous matter, which, when it was rubbed upon a piece of wood, made it immediately all over luminous; though, when the moisture was dried up, the light was extinguished.

The abbé Nollet was much struck with the luminousness of the sea when he was at Venice in 1749; and after taking a great deal of pains to ascertain the circumstances of it, concluded that it was occasioned by a shining insect; and having examined the water very often, he at length did find a small insect, which he particularly describes, and to which he attributes the light. The same hypothesis had also occurred to M. Vianelli, professor of medicine in Chioggia, near Venice; and both he and M. Grizellini, a physician in Venice, have given drawings of the insects from which they imagined this light to proceed.

The abbé was the more confirmed in his hypothesis, by observing, some time after, the motion of some luminous particles in the sea. For, going into the water, and keeping his head just above the surface, he saw them dart from the bottom, which was covered with weeds, to the top, in a manner which he thought very much resembled the motions of insects; though, when he endeavoured to catch them, he only found some luminous spots upon his handkerchief, which were enlarged when he pressed them with his finger.

M. Le Roi, making a voyage on the Mediterranean, presently after the abbé Nollet made his observations at Venice, took notice, that in the day-time, the prow of the ship in motion threw up many small particles, which, falling upon the water, rolled upon the surface of the sea for a few seconds before they mixed with it; and in the night the same particles, as he concluded, had the appearance of fire. Taking a quantity of the water, the same small sparks appeared whenever it was agitated; but, as was observed with respect to Dr. Beal's experiments, every successive agitation produced a less effect than the preceding, except after being suffered to rest awhile; for then a fresh agitation would make it almost as luminous as the first. This water, he observed, would retain its property of shining

by agitation a day or two; but it disappeared immediately on being set on the fire, though it was not made to boil.

M. Ant. Martin made many experiments on the light of fishes, with a view to discover the cause of the light of the sea. He thought that he had reason to conclude, from a great variety of experiments, that all sea-fishes have this property; but that it is not to be found in any that are produced in fresh water. Nothing in his opinion depended upon the colour of the fishes, except that he thought that the white ones, and especially those that had white scales, were a little more luminous than others. This light, he found, was increased by a small quantity of salt; and also by a small degree of warmth, though a greater degree extinguished it. This agrees with another observation of his, that it depends entirely upon a kind of moisture which they had about them, and which a small degree of heat would expel, when an oiliness remained which did not give this light, but would burn in the fire. Light from the flesh of birds or beasts is not so bright, he says, as that which proceeds from fishes. Human bodies, he says, have sometimes emitted light about the time that they began to putrify, and the walls and roof of a place in which dead bodies had often been exposed, had a kind of dew or clamminess upon it, which was sometimes luminous; and he imagined that the lights which are said to be seen in burying-grounds may be owing to this cause.

From some experiments made by Mr. Canton, he concludes, that the luminousness of sea-water is owing to the slimy and other putrescent substances it contains. On the evening of the 14th of June 1768, he put a small fresh whiting into a gallon of sea-water, in a pan which was about fourteen inches in diameter, and took notice that neither the whiting nor the water, when agitated, gave any light. A Fahrenheit's thermometer, in the cellar where the pan was placed, stood at 54°. The 15th, at night, that part of the fish which was even with the surface of the water was luminous, but the water itself was dark. He drew the end of a stick through it, from one side of the pan to the other, and the water appeared luminous behind the stick all they way, but gave light only where it was disturbed. When all the water was stirred, the whole became luminous, and appeared like milk, giving a considerable degree of light to the sides of the pan; and it continued to do so for some time after it was at rest. The water was most luminous when the fish had been in it about 28 hours; but would not give any light by being stirred, after it had been in it three days.

He then put a gallon of fresh water into one pan, and an equal quantity of sea-water into another, and into each pan he put a fresh herring of about three ounces. The next night the whole surface of the sea-water was luminous, without being stirred; but it was much more so when it was put into motion; and the upper part of the herring, which was considerably below the surface of the water, was also very bright; while at the same time the fresh water, and the fish that was in it, were quite dark. There were several very bright luminous spots on different parts of the surface of the sea-water; and the whole, when viewed by the light of a candle, seemed covered with a greasy scum. The third night, the light of the sea-water, while at rest, was very little, if at all, less than before; but when stirred its light was so great as to discover the time by a watch, and the fish in it appeared as a dark substance. After this its light was evidently decreasing, but was not quite gone before the 7th night. The fresh water and the fish in it were perfectly dark during the whole time. The thermometer was generally above 60°.

The preceding experiments were made with sea-water: but we now made use of other water, into which he put common or sea-salt, till he found by an hydrometer, that it was of the same specific gravity with the sea-water; and, at the same time, in another gallon of water, he dissolved two pounds of salt; and into each of these waters he put a small fresh herring. The next evening the whole surface of the artificial sea-water was luminous without being stirred; but gave much more light when it was disturbed. It appeared exactly like the real sea-water in the preceding experiment; its light lasted about the same time, and went off in the same manner: while the other water, which was almost as salt as it could be made, never gave any light. The herring which was taken out of it the seventh night, and washed from its salt, was found firm and sweet; but the other herring was very soft and putrid, much more so than that which had been kept as long in fresh water. If a herring, in warm weather, be put into 10 gallons of artificial sea-water, instead of one, the water, he says, will still become luminous, but its light will not be so strong.

It appeared by some of the first observations on this subject, that heat extinguishes the light of putrescent substances. Mr. Canton also attended to this circumstance; and observes, that though the greatest summer heat is well known to promote putrefaction, yet 20 degrees more than that of the human blood seems to hinder it. For putting a small piece of a luminous fish into a thin glass ball, he found, that water of the heat of 118 degrees would extinguish its light in less than half a minute; but that, on taking it out of the water, it would begin to recover its light in about 10 seconds; but it was never afterwards so bright as before.

Mr. Canton made the same observation that Mr. Ant. Martin had done, viz. that several kinds of river fishes could not be made to give light, in the same circumstances in which any sea-fish became luminous. He says, however, that a piece of carp made the water very luminous, though the outside, or scaly part of it, did not shine at all.

For the sake of those persons who may choose to repeat his experiments, he observes, that artificial sea-water may be made without the use of an hydrometer by the proportion of four ounces avoirdupois of salt to seven pints of water, wine-measure.

From undoubted observations, however it appears, that in many places of the ocean it is covered with luminous insects to a very considerable extent. Mr. Dagelet, a French astronomer who returned from the Terra Australis in the year 1774, brought with him several kinds of worms which shine in water when it is set in motion; and M. Rigaud, in a paper inserted (if we are not mistaken) in the Journal des Sçavans for the month of March 1770, affirms, that the luminous surface of the sea, from the port of Brest to the Antilles, contains an immense quantity of little, round, shining polypuses of about a quarter of

a line in a diameter. Other learned men, who acknowledge the existence of these luminous animals, cannot, however, be persuaded to consider them as the cause of all that light and scintillation that appear on the surface of the ocean: they think that some substance of the phosphorous kind, arising from putrefaction, must be admitted as one of the causes of this phenomenon. M. Godhou has published curious observations on a kind of fish called in French *bonite*, already mentioned; and though he has observed, and accurately described, several of the luminous insects that are found in sea-water, he is, nevertheless, of opinion, that the scintillation and flaming light of the sea proceed from the oily and greasy substances with which it impregnated.

The abbé Nollet was long of opinion, that the light of the sea proceeded from electricity, though he afterwards seemed inclined to think, that this phenomenon was caused by small animals, either by their luminous aspect, or at least by some liquor or effluvia which they emitted. He did not, however, exclude other causes; among these, the spawn or fry of fish deserves to be noticed. M. Dagelet, sailing into the bay of Antogil, in the island of Madagascar, observed a prodigious quantity of fry, which covered the surface of the sea above a mile in length, and which he at first took for banks of sand on account of their colour; they exhaled a disagreeable odour, and the sea had appeared with uncommon splendor some days before. The same accurate observer, perceiving the sea remarkably luminous in the road to the Cape of Good Hope during a perfect calm, remarked, that the oars of the canoes produced a whitish and pearly kind of lustre; when he took in his hand the water which contained this phosphorus, he discerned in it, for some minutes, globules of light as large as the heads of pins. When he pressed these globules, they appeared to his touch like a soft and thin pulp; and some days after the sea was covered near the coasts with whole banks of these little fish in innumerable multitudes.

To putrefaction, also, some are willing to attribute that luminous appearance which goes by the name of ignis fatuus. It is most frequently observed in boggy places and near rivers, though sometimes also in dry places. By its appearance benighted travellers are said to have been sometimes misled into marshy places, taking the light which they saw before them for a candle at a distance; from which seemingly mischievous property it has been thought by the vulgar to be a spirit of a malignant nature, and been named accordingly Will with a wisp, or Jack with a lanthorn; for the same reason also it probably had its Latin name ignis fatuus.

This kind of light is said to be frequent about burying places and dung-hills. Some countries are also remarkable for it, as about Bologna in Italy, and some parts of Spain and Ethiopia. A very remarkable account of an ignis futuus is given by Dr. Shaw in his travels to the Holy Land.

It appeared in the valleys of mount Ephraim, and attended him and his company for more than an hour. Sometimes it would appear globular, or in the shape of the flame of a candle; at others it would spread to such a degree as to involve the whole company in a pale inoffensive light, then contract itself, and suddenly disappear; but in less than a minute would appear again; sometimes running swiftly along, it would expand itself at certain intervals over more than two or three acres of the adjacent mountains. The atmosphere from the beginning of the evening had been remarkably thick and hazy; and the dew, as they felt it on the bridles of their horses, was very clammy and unctuous.

Lights resembling the ignis fatuus are sometimes observed at sea, skipping about the masts and rigging of ships; and Dr. Shaw informs us, that he has seen these in such weather as that just mentioned when he saw the ignis fatuus in Palestine. Similar appearances have been observed in various other situations; and we are told of one which appeared about the bed of a woman in Milan, surrounding it as well as her body entirely. This light fled from the hand which approached it; but was at length entirely dispersed by the motion of the air.

*Philosophy of Spontaneous Illumination.*

It is a fact now fully ascertained and rendered incontestible that light has a considerable influence upon all animal and vegetable living substances exposed to its influence: that all imbibe it in some degree, and many rapidly and voraciously. Most of the discous flowers, by some power unknown to us, follow the sun in his course. They attend him to his evening retreat, and meet his rising lustre in the morning with the same unerring law. If a plant also is shut up in a dark room, and a small hole is afterwards opened by which the light of the sun may enter, the plant will turn towards that hole, and even alter its own shape in order to get near it; so that though it was straight before, it will in time become crooked, that it may get near the light. It is not the heat, but the light of the sun, which it thus covets; for, though a fire be kept in the room, capable of giving a much stronger heat than the sun, the plant will turn away from the fire in order to enjoy the sun's light.—The green colour of plants also depends on the sun's light being allowed to shine upon them; for without this they are always white.

With the various secretions, and even solid parts of many of these substances, the matter of light unites most intimately; in other classes of animals and vegetables it exists more loosely, and consequently is more easily separated from them.

This separation appears to take place in two ways: first during life by a peculiar set of organs which have a power of secreting it from the general fluids or the rest of the body; and secondly by the tendency to decomposition which uniformly takes place upon death, in consequence of which agreeably to the universal law of chemical affinity homogenous particles unite themselves with homogeneous particles, and escape in a more sensible, because in a more aggregate and concentrated form.

Upon this simple view of the subject we may easily account for all the phœnomena noticed by successive observers, and narrated in the preceding part of this article, as well as for a variety of others of a similar character. The light thus thrown forth was till very lately regarded as phosphorescent, especially by Spallanzani and Fourcroy; while Caradin believed it to be innate, and formed by some chemical process of the organs of the animal exhibiting it. That it is not of a phosphoric nature is clearly proved, because it is in no instance, and in no respect inflammable, and hence we have preferred to treat upon this subject under the present title rather than under that of *phosphorescent substances*, the

title generally selected by which to characterize them. But whether it be not in some instances generated internally instead of being derived ab extra, is by no means equally well ascertained. Many luminous animals appear to shun the light of the day, and seem scarcely to expose themselves sufficiently to its influence to be able to throw forth such a quantity as we see issue from their bodies. Yet, on the other hand, it should not be forgotten that almost all substances whatever, mineral, as well as animal and vegetable, and gasseous and liquid as well as solid, absorb and contain a great quantity of latent light, a part of which may enter into the bodies of luminous animals in the form of food, and may be separated from its respective combinations by its luminous organs.

*Living luminous Substances.*

These are very numerous, though they have never hitherto been arranged into any distinct classification or tabular form. They consist chiefly, and almost exclusively of *insects and zoophytes; molluscous worms;* though instances are occasionally met with among other worms. Insects furnish nearly a dozen distinct genera, of which almost all the species are luminous. The chief are the lampyris, or glow-worm, and firefly tribes; the fulgora, or lantern-fly; the scolopendra, or centipede, the fausus sphœrocenus, the elater noctilucus and the cancer fulgens. Among the worm-class the principal are the phloas, or pholas as it is now generally, but erroneously denominated, the pyrosoma, the medusa phosphorea, the nereis noctiluca, the pennatula, or sea-pen, and various species of the sepia or cuttle-fish. See these articles under their respective heads. The atmosphere in some parts of Italy appears occasionally to be on fire, in the evening, from the great quantities of one species of the lampyris that throng together. A single individual of the South-American fulgora, fixed upon the top of a cane or other staff will afford light enough to read by. The streams of light that issue from the elater noctilucus are so strong in the night that even the smallest print may be read by their lustre. The pyrosoma, when at rest, emits a pale blue lustre; but when in motion a much stronger light variegated by all the colours of the rain-bow. The phloas secretes a luminous juice, every drop of which illuminates for a length of time whatever substance it falls upon or even touches; and the animal after death may be preserved so as to retain its luminous power for at least a twelvemonth. The noctilucent nereis often illuminates by its numbers, the waters it inhabits to a very considerable extent, and gives so bright a splendour to the waves that, like the atmosphere when lighted up by the lampyris italica, they appear as though they were in a full flame. The organ from which the luminous matter is thrown forth in these different animals is of a very different character, and placed in very different parts of the body: sometimes in the head, sometimes in the tail, sometimes in the antennas, sometimes over the surface generally.

*Dead luminous Substances.*

Light, as we have already observed, being more or less absorbed by bodies of all kinds, may be expected under circumstances which tend to unite or aggregate its particles, to flow off in a percipient form from all those which have absorbed it in a greater degree, or retain it after absorption in a looser manner than others. Thus it exists in the shells of marine-fishes or testaceous worms, and is set at liberty and flows off in a visible form after calcination. It exists in the dead trunks of various vegetables, and hence on the commencement of a putrefactive decomposition, the particles unite together agreeably to the laws of chemical affinity and flow off in like manner: whence the luminous appearance exhibited in various species of rotten-wood. It exists largely in the bodies of many kinds of animals, and more largely in some animal organs than in others; hence we see it issuing sometimes from putrescent flesh, sometimes from bones, teeth, bezoars, nephritic and urinary calculi, and egg-shells that have been exposed to the sun.

In marine fishes it appears to be more accumulated than in the bodies of any animals, though for want of appropriate luminous organs, these are not found to secrete it (at least not aggregately and palpably) during life.

For the best experiments we possess upon this subject we are indebted to Doctor Hulme, who, while he has rectified many errors of the analysts, has confirmed the more important and more valuable. Dr. Hulme found that light is one of the first, perhaps the first elementary substance that flies off during decomposition: hence it can only be obtained from putrescent fishes, or pieces of fishes in a putrescent state or stage of incipient putrefaction: for after putrefaction is completed, light escapes no longer in a visible form, either forming new combinations with the other gasses that are now escaping, or perhaps having entirely escaped already. He found also that it was in a considerable degree adhesive, and would continue attached to the surface of the body that had emitted it, or to the fingers or any other substance to which it was transferred by scraping. Thus pieces of herring were observed to continue luminous for about forty-eight, and thence to sixty hours after they first discovered light, and then ceased to be luminous any longer. Having scraped off the luminous body he mixed it with solutions of Epsom and other salts, and found that in slight solutions it shone brighter: but that in strong solutions it became apparently extinguished, though it again revived by mixing more water, and reducing the solution to its proper debility; and thus by alternately adding fresh salt, and new supplies of water he has sometimes revived the same light after ten extinctions. Great cold and heat are also found to extinguish it; yet a moderate heat renders it more brilliant: it begins to be extinguished at 96°: and when the thermometer is raised to 100 it can be no more revived. It is however capable of being revived after being frozen by frigorific mixtures.

It is, therefore, an anomalous fact that the light of dead glow-worms continues to augment in heated water increased to 114 degrees.

*Luminous appearance of the Sea.*

From what has already been observed, this beautiful and brilliant phœnomenon is not difficult to be accounted for in most cases: for the vast mass of the ocean contains in itself whatever has the greatest tendency to the production of such a phœnomenon. It is the natural province of the greater number of those animals that secrete light from peculiar organs with which they are endowed for this purpose, of phloades, nereids, medusas, and luminous cancers; it holds in its immense bosom at all times, an

enormous quantity of that kind of animal matter (marine fishes) which is most disposed to throw forth its latent light in an aggregate and visible form, during its first progress of decomposition; and unites the different circumstances which chiefly favour such an evolution; such, for instance, as a fluid menstruum, temperate warmth, and a solution of muriat of soda or common salt.

If then we see occasionally in vegetable matter undergoing a slow decomposition, as in rotten wood, a certain portion of light poured forth in a visible form; if we see it issuing in a still greater degree from bones and shells that have undergone the process of calcination; if we see it still more freely at times, and under circumstances, thrown forth from the animal exuviæ of church-yards, and adhering to the surface of the spot from which it issues, in like manner as the light scraped off from the scales of pieces of putrescent fishes immersed in salt water, adheres to the knife or the fingers that are employed for this purpose; how much more easily may we expect to see it thrown forth and in how much larger quantities, from different parts of the ocean under circumstances that may favour its escape, often adhering to the sides of vessels, or of their oars as they are alternately raised from the water and producing a long line or an extended sheet of wonderful brilliancy not unfrequently variegated by every playfulness of colour.

It appears obvious, moreover, that it is not to one cause only, but to many that such phœnomena are to be ascribed, at different periods and in different parts of the world. Linnéus inclined to confine it chiefly to vast flocks of the nereis tribe: but we have already observed that even at sea, and among living animals, medusas, sapias, pennatulas, pyrosomas, and phloades equally concur: while, on other occasions, the waves appear brilliantly illuminated, and through a very extensive range, without a trace of any living substance whatever possessed of a luminous power; and can only acquire their light from the decomposition of dead animal matter.

LUMP. *s.* (*lompe*, Dutch.) 1. A small mass of any matter (*Boyle*). 2. A shapeless mass (*Keil*). 3. Mass undistinguished (*Woodward*). 4. The whole together; the gross (*Addison*).

*To* LUMP. *v. a.* To take in the gross, without attention to particulars (*Addison*).

LUMP-*fish.* See CYCLOPTERUS.

LU'MPING. *a.* (from *lump.*) Large; heavy; great (*Arbuthnot*).

LU'MPISH. *a.* (from *lump.*) Heavy; gross; dull; inactive; bulky (*Raleigh*).

LU'MPISHLY. *ad.* With heaviness; with stupidity.

LU'MPISHNESS. *s.* (from *lumpish.*) Stupid heaviness.

LU'MPY. *a.* (from *lump.*) Full of lumps; full of compact masses (*Mortimer*).

LUNA (*the moon*) was daughter of Hyperion and Terra, and was the same, according to some, as Diana. She was worshipped by the ancients with many superstitious ceremonies. It was supposed that magicians, particularly those of Thessaly, had an uncontrollable power over the moon, and that they could draw her down from heaven at pleasure by the mere force of their incantations.

LUNA (anc. geog.), a forest of Germany, at no great distance from the Hercynia; below which were the Boemi: it was therefore in Moravia, near the springs of the Marus, now March, which runs into the Danube over against Carnutum.

LUNA, or *Lunna*, a town of Gallia Celtica. Now Clugny in Burgundy.

LUNA, a town and port of Liguria, at the mouth of the Macra. The town was but small, but the port large and beautiful, according to Strabo. Now extinct, and its ruins called Luna Distrutta. It was famous for its quarries of white marble, thence called Lunense; and for its cheese, remarkable rather for its size than goodness, each being a thousand weight.

LUNA, in chemistry. (*Luna, æ,* f. so named from its resemblance in brightness to silver). The old alchemistic name of silver. See SILVER.

LUNA *Cornea.* In chemistry, a white curdy precipitate of muriat of silver, which takes place when the nitrat, acetat, or any other soluble salt of silver comes in contract with the muriatic acid, either single, or in any soluble combination.

LU'NACY. *s.* (from *luna*, Latin, the moon.) A kind of madness influenced by the moon; madness in general (*Suckling*).

LU'NAR. } LU'NARY. } *a.* (*lunaire*, French; *lunaris*, Latin.) 1. Relating to the moon (*Dryden*). 2. Being under the influence of the moon (*Brown*).

LUNAR *Caustic.* See ARGENTUM *Nitratum.*

LUNAR *Distance*, in nautical astronomy, a term applied to denote the distance of the moon from the sun, or from a fixed star lying nearly in the place of its path. The measurement of the apparent lunar distances, and the determination of the true lunar distances from thence, is of great use in determining the longitude of places on the earth. See LONGITUDE.

LUNAR *Month* and *Year*. See MONTH and YEAR.

LUNARE os, in anatomy, is the second bone in the first row of the carpus. It has its name from the Latin, *luna*, "the moon," because one of its sides is in form of a crescent.

LUNA'RIA. Honesty. Satin-flower. Moonwort. In botany, a genus of the class tetradynamia; order siliculosa. Silicle entire, elliptic, compressed, flat, pedicelled; the valves flat, equalling and parallel to the partition; calix with two of the leaflets pouched at the base. Two species—natives of Europe.

1. L. Redivia. Leaves with mucronate teeth; silicles oblong, tapering to both ends: flowers violet coloured and odorous.

2. L. Annua. Leaves obtusely toothed; silicles roundish, obtuse at both ends: root biennial, flowers inodorous.

Both plants will grow in almost any soil, but succeed best in a shady situation.

LU'NATED. *a.* (from *luna*, Latin.) Formed like a half moon.

LU'NATIC. *a.* (*lunaticus*, Latin.) Mad; having the imagination influenced by the moon (*Shakspeare*).

Lu'natic. *s.* A madman (*Graunt*).

LUNA'TION. *s.* (*lunaison*, French.) The revolution of the moon (*Holder*).

LU'NCH. } *s.* (from *clutch*, or *clunch.*)
LU'NCHEON. } As much food as one's hand can hold (*Gay*).

LUND, the most ancient town of Sweden, capital of Schonen, with an archbishopric and a university. It contains scarcely more than eight hundred houses, carries on but little trade, and is principally supported by its university, founded by Charles XI. and from him called Academia Carolina Gothorum. Here likewise is a royal physiographical society, incorporated by the king in 1778. The cathedral is an ancient irregular building. It is 20 miles south-east of Landscrona, and 225 south-west of Stockholm. Lon. 13. 26. E. Lat. 55. 33. N.

LUNDEN, a town of Lower Saxony, in the duchy of Holstein, seated near the Eyder, 36 miles north-north-west of Gluckstadt. Lon. 9. 20. E. Lat. 54. 26. N.

LUNDY, an island in the mouth of the Bristol channel, near the middle, between Devonshire and Pembrokeshire. Lon. 4. 13. W. Lat. 51. 25. N.

LUNE. See Lon.

Lune. *s.* (*luna*, Latin.) 1. Any thing in the shape of a half moon. 2. Fits of frenzy; mad freaks (*Shakspeare*).

Lune, *Lunula*, or little moon; in geometry, is a figure, in form of a crescent, terminated by the arcs of two circles that intersect each other within.

Though the quadrature of the whole circle has never been effected, yet many of its parts have been squared. The first of these partial quadratures was that of the lunula, given by Hippocrates of Scio, or Chios; who, from being a shipwrecked merchant, commenced geometrician. But although the quadrature of the lune be generally ascribed to Hippocrates, yet Proclus expressly says it was found out by Oenopidas, of the same place. See *Heinius in Mem. de l'Acad. de Berlin*, tom. ii. p. 410. where he gives a dissertation concerning this Oenopidas. See also Circle and Quadrature.

The lune of Hippocrates is this: Let ABC fig. 11. pl. 99. be a semicircle, having its centre E, and ADC a quadrant, having its centre F; then the figure ABCDA, contained between the arcs of the semicircle and quadrant, is his lune; and it is equal to the right-angled triangle ACF, as is thus easily proved. Since $AF^2 = 2AE^2$, that is, the square of the radius of the quadrant equal to double the square of the radius of the semicircle; therefore the quadrantal area ADCFA is = the semicircle ABCEA; from each of these take away the common space ADCEA, and there remains the triangle ACF = the lune ABCDA.

Another property of this lune, which is the more general one of the former, is, that if FG be any line drawn from the point F, and AH perpendicular to it; then is the intercepted part of the lune AGIA = the triangle AGH cut off by the chord line AG; or in general, that the small segment AKGA is equal to the trilineal AIHA. For, the angle AFG being at the centre of the one circle, and at the circumference of the other, the arcs cut off AG, AI are similar to the wholes ABC, ADC, therefore the small seg. AKGA is to the semisegment AIH, as the whole semicircle ABCA to the semisegment or quadrant ADCF, that is in a ratio of equality.

Again, if ABC (fig. 12) be a triangle, right angled at C, and if semicircles be described on the three sides as diameters; then the triangle T (ABC) is equal to the sum of the two lunes L1, L2. For, the greatest semicircle is equal to the sum of both the other two; from the greatest semicircle take away the segments S1 and S2, and there remains the triangle T; also from the two less semicircles take away the same two segments S1 and S2, and there remains the two lunes L1 and L2; therefore the triangle T = L1 + L2 the two lunes.—(*Hutton's Dictionary.*) See also the remarks of Perks, David Gregory, Caswell, and Wallis, on the quadrature of the lunula, in *Phil. Trans.* No. 259, or vol. iv. p. 452, New Abridgement: and, for "the dimensions of the solids generated by the conversion of Hippocrates's lunula, and of its parts about several axes, with the surfaces generated by that conversion," see Demoivre's paper in *Phil. Trans.* No. 265, or New Abridgement, vol. iv. p. 505.

LUNEL, a town of France, in the department of Gard, near the river Ridourle. It produces excellent Muscadine wine, and is 16 miles east of Montpellier. Lon. 4. 19. E. Lat. 43. 38. N.

LUNEN, a town of Westphalia, in the county of Marche, situate at the conflux of the Zesick and Lippe, 20 miles south-south-west of Munster. Lon. 7. 49. E. Lat. 51. 40. N.

LUNENBURG, a duchy of Germany, in the circle of Lower Saxony, subject to the elector of Hanover. Including Zell, it is bounded on the north by the Elbe, which separates it from Holstein and Lawenburg, on the east by the marquisate of Brandenburg, on the south by the duchy of Brunswick, and on the west by the duchies of Bremen and Westphalia. It is 100 miles in length and 70 in breadth; watered by the rivers Aller, Elbe, and Ilmenau. Part of it is full of heaths and forests, which abound with wild boars; but near the rivers it is pretty fertile.

LUNENBURG, a fortified town of Lower

Saxony, capital of a duchy of the same name. The chief public edifices are three parish churches, the ducal palace, three hospitals, the townhouse, the salt magazine, the anatomical theatre, the academy, and the conventual church of St. Michael, in which are interred the ancient dukes; it also contains a famous table, eight feet long and four wide, plated over with chased gold, and the rim embellished with precious stones, of an immense value, which was taken from the Saracens by the emperor Otho, and presented to this church; but in 1698, a gang of thieves stripped it of 200 rubies and emeralds, together with a large diamond, and most of the gold, so that at present but a small part of it remains. Here are some very rich salt springs. Formerly, when there was a greater demand for the salt, upwards of 120,000 tons have been annually boiled here, and sold off: but since the commencement of the present century, the salt trade hath declined greatly. A fifth of the salt made here belongs to the king, but is farmed out. It is said to excel all the other salt made in Germany. This town is well fortified; and has a garrison, which is lodged in barracks. In the neighbourhood is a good lime-stone quarry; and along the Ilmenau are warehouses, in which are lodged goods brought from all parts of Germany, to be forwarded by the Ilmenau to Hamburgh, or by the Asche to Lubec, from whence other goods are brought back the same way. The town itself drives a considerable traffic in wax, honey, wool, flax, linen, salt, lime, and beer.

LUNETTE, in fortification, an inveloped counterguard, or mound of earth, made beyond the second ditch, opposite to the place of arms; differing from the ravelins only in their situation. Lunettes are usually made in wet ditches, and serve the same purpose as fausse-brays, to defend the passage of the ditch.

Lunette, in farriery a half horse-shoe, or such a one as wants that part of the branch which should run towards the quarter.

Lunette is also the name of a shade, consisting of two small pieces of felt, made round and hollow, to cover the eyes of a vicious horse that is apt to bite, and strike with his fore feet.

LUNG-wort, in botany. See Pulmonaria.

LUNGS. *s.* (lungen, Saxon.) Two viscera situated in the cavities of the chest, by means of which we breathe. The lung in the right cavity of the chest is divided into thee lobes; that in the left cavity into two. They hang in the chest, attached at their superior part to the neck, by means of the trachea, and are separated by the mediastinum. They are also attached to the heart by means of the pulmonary vessels. The substance of the lungs is of four kinds, viz. vesicular, vascular, bronchial, and a parenchymatous substance. The vesicular substance is composed of the air-cells. The vascular invests those cells like a net-work. The bronchial is throughout the lungs, having the air-cells at their extremities; and the spongy substance that connects the spaces between these parts is termed the *parenchyma*. The lungs are covered with a fine membrane, a reflexion of the pleura, called *pleura pulmonalis*. The iuternal surface of the air-cells is covered with a very fine, delicate, and sensible membrane, which is continued from the larynx through the trachea and bronchia. The arteries of the lungs are the pulmonary, which circulate the blood along the air-cells to undergo a certain change, and the bronchial artery, a branch of the aorta, which carries blood to the lungs for their nourishment. The pulmonary veins return the blood that has undergone this change, by four trunks, into the left auricle of the heart. The bronchial veins terminate in the vena azygos. The nerves of the lungs are from the eighth pair and great intercostal. The absorbents are of two orders; the superficial and deep-seated: the former are more readily detected than the latter. The glands of these viscera are called bronchial. They are muciparous, and situated about the bronchia. See Pulmo.

LU'NGED. *a.* (from *lungs.*) Having lungs; having the nature of lungs (*Dryden*).

LUNG-Grown. *a.* (*lung* and *grown.*) The lungs sometimes grow fast to the skin that lines the breast, such are lung-grown (*Harvey*).

LUNISOLAR Year, in chronology, the the space of 532 common years; found by multiplying the solar by the lunar cycle.

LUNT. *s.* (*lonte*, Dutch.) The match cord with which guns are fired.

LUNULA, in Geometry. See Lune.

LU'NULATE. In botany, applied to the leaf. Subrotundum, basi excavatum, angulis posticis notatum.—(*Philos. Bot.*) In Delin. Pl. it is called *lunate*, and the explanation is somewhat differently worded—subrotundum, basi sinu divisum, angulis posticis acutis.—It is singular that Dr. Berkenhout, who seldom gives any equivalent English terms, should translate *lunatum*, moon-shaped; and *lunula*, a half-moon; though he explains it, rightly enough, shaped like a small crescent. In which sense only it is used in botany; though among the ancients *lunatus* is put for the shape of the moon, both when full and in a crescent.

Lu'nulate is likewise applied to the keel of the flower in *Polygala myrtifolia*. Also to the stipule and spike. See Crescent-shaped.

LUPERCALIA, feasts instituted in ancient Rome, in honour of the god Pan.—The word comes from *Lupercal*, the name of a place under the Palatine mountain, where the sacrifices were performed. The Lupercalia were celebrated on the 15th of

the calends of March, that is, on the 15th of February, or, as Ovid observes, on the third day after the ides. They are supposed to have been established by Evander. On the morning of this feast, the Luperci, or priests of Pan, ran naked through the streets of Rome, striking the married women they met on the hands and belly with a thong or strap of goat's leather, which was held an omen promising them fecundity and happy deliveries.

LUPIA. (*Lupia*, *æ*, f. λυπια: from λυπεω, to molest.) A genus of disease, including encysted humours, whose contents are very thick, and sometimes solid, as *meliceris*, *atheroma*, *steatona*, and *ganglion*.

LUPINE, in botany. See LUPINUS.

LUPI'NUS. Lupine. In botany, a genus of the class diadelphia, order decandria. Calyx two-lipped; anthers five of them oblong, five roundish: legume compressed, coriaceous, swelling at the seeds. Nineteen species: Europe; Asia; America; one a native of the Cape. They may be thus subdivided.

A. Herbaceous: leaves in finger-like divisions.

B. Shrubby: leaves in finger-like divisions.

C. Herbaceous: with simple leaves. They are all hardy annuals, ornamented with long whorled spikes of papilionaceous flowers, white, blue, yellow and rose-coloured. They are easily raised from seeds, and make a handsome appearance in open borders.

LU'PULUS, (*Lupulus*, *i*. m. from λυπη, dislike, so named from its bitterness.) The hop. It is the floral leaf or bractea of this plant, *Humulus lupulus* of Linnéus, that is dried and used in various kinds of strong beer. Hops have a bitter taste, less ungrateful than most of the other strong bitters, accompanied with some degree of warmth and aromatic bitter, and are highly intoxicating. The hop flower also exhales a considerable quantity of its narcotic power in drying, hence those who sleep in the hop-houses are with difficulty roused from their slumber. A pillar stuffed with these flowers was said to have laid our present monarch asleep when other remedies had failed.

We have already observed in another article that this plant has of late been introduced in the new pharmacopoeia of the London college under the forms of extract and tincture, as a valuable aromatic bitter. See HUMULUS.

LUPUS, a Roman, who, contrary to the omens, marched against the Marsi, and was killed with his army. He has been taxed with impiety, and was severely censured in the Augustan age. (*Horat.*)

LUPUS, in zoology. See CANIS.

LUPUS, Wolf, in astronomy, a southern constellation, joined to the Centaur. According to the Britanic Catalogue this constellation has 24 stars, numbered thus according to their magnitudes, 0, 0, 2, 3, 16, 3.

LUPUS *Marinus*. See ANARICHAS.

LUPUS, in ornithology. See MONEDULA.

LURCH. *s.* *To leave in the* LURCH. To leave in a forlorn or deserted condition (*Arbuth.*)

*To* LURCH. *v. n.* (*loeren*, Dutch.) 1. To shift; to play tricks (*Shakspeare*). 2. To lie in wait: we now use *lurk* (*L'Estrange*).

*To* LURCH. *v. a.* (*lurcor*, Latin.) 1. To devour; to swallow greedily (*Bacon*). 2. To defeat; to disappoint (*South*). 3. To steal privily; to filch; to pilfer.

LU'RCHER. *s.* (from *lurch.*) 1. One that watches to steal, or to betray or entrap (*Gay*). 2. (*lurco*, Latin.) A glutton; a gormandizer.

LURCHER.—A variety of the dog tribe, characterized by being rough and wirey haired, with ears erect, but dropping a little at the points: above the middle size, of a yellowish or sandy red colour; and of great speed courage and fidelity. They are supposed to be mules produced from a cross between the shepherd's dog and the greyhound, which, from breeding in and in with the latter, has so refined upon the original cross, that very little of the shepherd's dog is retained in its stock, its docility and fidelity excepted. They are the favourite dogs of small farmers, since they can both act the part of a sheep dog, and occasionally trip up the heels of a leveret three parts grown. They are also the constant companions of professed and notorious poachers, being admirably adapted to such a kind of service: they equal, if not exceed, any other kind of dog in sagacity; and are easily taught any thing that an animal of this description can acquire. Some of them are very little inferior in speed to well-bred greyhounds: hares they frequently run up to: rabbits they kill to a certainty, if the latter be at any distance from home: if near a warren, the dog invariably runs for the burrow, by doing which, he seldom fails in his attempt to secure his aim. His qualifications go still farther; in the nocturnal excursions of poachers, he will easily pull down a fallow deer, as soon as the signal is given for pursuit; which done, he will explore his way to his master, and conduct him to the game, wherever he may have left it. In poaching for hares however they are peculiarly serviceable, for when the wires are fixed at the meuses, and the nets at the gates, a lurcher or two dispatched by a single word of command, will scour the field, paddock, or plantation, with the most perfect silence and secure an ample harvest.

LURE, in falconry, a device of leather, in the shape of two wings, stuck with feathers and baited with a piece of flesh, to call back a hawk when at considerable distance.

Hence lure signifies any enticement; any thing that promises advantage (*Milton*).

*To* LURE. *v. n.* (from the noun.) To call hawks (*Bacon*).

*To* LURE. *v. a.* To attract; to entice (*Gay*).

LURGAN, a post and fair town in the county of Armagh and province of Ulster in Ireland, 67 miles from Dublin. It is a flourishing town, agreeably situated in the midst of a much improved country; and the inhabitants are extensively engaged in the linen manufacture. It stands on a gentle eminence, about two miles from Lough Neagh, of which it commands a most beautiful and extensive prospect. The fairs are three in the year. Lon. 6. 31. W. Lat. 54. 35. N.

LURGAN-*green*, a post and fair town of Ireland, in the county of Louth and province of Leinster, 37 miles from Dublin; a mile beyond which is a handsome seat of the earl of Charlemont. It has three fairs in the year.

LU'RID. *a.* (*luridus*, Latin.) Gloomy; dismal (*Thomson*).

LU'RIDÆ. In botany. (*Luridus*, a dusky or livid colour. Linnéus makes it synonymous with *fuscus*.) The name of the thirty-third order in Linnéus's Fragments, and of the twenty-eighth in his Ordines Naturales.

*To* LURK. *v. n.* To lie in wait; to lie hidden; to lie close (*Spenser*).

LU'RKER. *s.* (from *lurk*.) A thief that lies in wait.

LU'RKINGPLACE. *s.* (*lurk* and *place*.) Hiding place; secret place (*Samuel*).

LUS, a town of France in the department of Upper Pyrennées, and chief place of a canton, in the district of Argellez; one league south west, Berege, and three south Argellez.

LUSATIA, a country of Germany, bounded on the north by the mark of Bradenburg, on the east by Silesia, on the south by Bohemia, and on the west by Meissen. It is about twenty-eight leagues long, and fifteen wide, and is divided into Upper and Lower. Upper Lusatia abounds more in mountains and hills, and enjoys a purer air, than the Lower, in which are found many boggy and moorish tracts. The latter, on the contrary, has a great number of woods, and those finer ones than are to be met with in the first, the fat tracts of which generally feel a great scarcity of timber, with which the others, notwithstanding, are sufficiently provided, and even the very great heaths themselves to exuberance. In Lusatia are made all sorts of linen, from unbleached yarn, common and fine, as also fine white damask for table and bed-cloths, and white tick. The black and fine dyings also support many hands; and, exclusive of these, there are in Lusatia good manufactures of hats, leather, paper, gunpowder, iron, glass, and wax-bleaching, together with other works of artists and handicrafts-people. By means of these manufactures, and in particular by means of the cloths and linens, a considerable trade is carried on there, which, indeed, is not at present so great as it was formerly, but still is not unimportant, being productive of great advantage to Lusatia, as it exceeds the importation in wool, yarn, and silk, which are employed for their manufactures in foreign silk, and wollen commodities, gold and silver lace points, &c. in wines, spices, corn, fresh and baked fruits, garden-stuff, and hops. The great trade carried on in linen, had its beginning in the year 1684. Upper Lusatia, formerly belonged to Bohemia. Lower Lusatia, which alone, till the fifteenth century, was called *Lusatia*, was first erected into a marquisate in the year 931, by Henry I. king of Germany. In the middle of the sixteenth century, they were both ceded to the elector of Saxony, in consideration of a large sum of money, which the elector had advanced to the emperor, in his war with the Bohemians, with condition only that the kings of Bohemia should retain the armorial bearings. The whole is now divided between the king of Prussia and the elector of Saxony.

LU'SCIOUS. *a.* (from *luxurious*.) 1. Sweet, so as to nauseate. 2. Sweet in a great degree (*Dryden*). 3. Pleasing; delightful (*South*).

LU'SCIOUSLY. *ad.* Sweet in a great degree.

LU'SCIOUSNESS. *s.* (from *luscious*.) Immoderate sweetness. (*Decay of Piety*).

LU'SERN. *s.* (*lupus cervarius*, Lat.) A lynx.

LUSH. *a.* Of a dark, deep, full colour, opposite to pale and faint. (*Shakspeare*).

LUSIGNAN, a town of France, in the department of Vienne, seated on the Vonne, 15 miles south south-west of Poitiers, and 200 of Paris. Lon. 0. 10. E. Lat. 45. 25. N.

LUSITANIA (anc. geog.) one of the divisions of Spain, extending to the north of the Tagus, quite to the sea of Cantabria, at least to the Promontorium Celticum. But Augustus, by a new regulation, made the Anas its boundary to the south, the Durius to the north; and thus constituting only a part of the modern Portugal. *Lusitani*, the people, (*Diodorus*, *Stephanus*).

LUSO, a river of Italy, which rises in the duchy of Urbino, crosses part of Romagno, and falls into the gulf of Venice, 10 miles west of Rimini.

LUSK. *a.* (*lusche*, Fr.) Idle; lazy; worthless.

LU'SKISH. *a.* (from *lusk*.) Somewhat inclinable to laziness or indolence.

LUSHKISHLY. *ad.* *Lazily*; *indolently*.

LU'SKISHNESS. *s.* (from *luskish*.) A disposition to laziness. (*Spenser*).

LUSO'RIOUS. *a.* (*lusorius*, Latin). Used in play; sportive. (*Sanderson*).

LU'SORY, *a.* (*lusorius*, Latin.) Used in play. (*Watts*).

LUSSAN (Margaret de), a French romance writer, was the daughter of a coachman, and born in 1682. Attracting the notice of the famous Huet, he gave her an education which she highly improved. She died in 1758. Her works are numerous, the best of which is entitled, Anecdotes de la Cour de Phillippe Auguste, 6 vols. 12mo.

LUST. *s.* (luſt, Saxon.) 1. Carnal desire (*Taylor*). 2. Any violent or irregular desire (*Peacham*). 3. Vigour; active power: not used. (*Bacon*).

*To* LUST. *v. n.* 1. To desire carnally (*Roscommon*). 2. To desire vehemently (*Knolles*). 3. To list; to like: out of use (*Psalms*). 4. To have irregular dispositions (*James*).

LU'STFUL. *a.* (*lust* and *full.*) 1. Libidinous; having irregular desires (*Til.*) 2. Provoking to sensuality; inciting to lust (*Milton*).

LU'STFULLY. *ad.* (from *lustful.*) With sensual concupiscence.

LU'STFULNESS. *s.* (from *lustful.*) Libidinousness.

LU'STIHED. } *s.* (from *lusty.*) Vigour; LU'STIHOOD. } sprightliness; corporal ability: not in use. (*Shakspeare*).

LU'STILY. *ad.* (from *lusty.*) Stoutly; with vigour; with mettle (*Southern*).

LU'STINESS. *s.* (from *lusty.*) Stoutness; sturdiness; strength; vigour of body (*Dryden*).

LU'STLESS. *a.* (from *lust.*) Not vigorous; weak (*Spenser*).

LUSTRAL, an epithet given by the ancients to the water used in their ceremonies to sprinkle and purify the people. From them the Romanists have borrowed the holy water used in their churches.

Lustral-Day, (*Dies Lustricus*), that whereon the lustrations were performed for a child, and its name given; which was usually the ninth day from the birth of a boy, and the eighth from that of a girl. Though others performed the ceremony on the last day of that week wherein the child was born, and others on the fifth day from its birth. Over this feast-day the goddess Nundina was supposed to preside; the midwives, nurses, and domestics, handed the child backwards and forwards, around a fire burning on the altars of the gods, after which they sprinkled it with water; hence this feast had the name of *amphidromia*. The old women mixed saliva and dust with the water. The whole ended with a sumptuous entertainment.

LUSTRATIONS, in antiquity, ceremonies, by which the ancients purified their cities, fields, armies, or people, defiled by any crime or impurity. Some of these lustrations were public, others private. There were three species or manners of performing lustration, *viz.* by fire and sulphur, by water, and by air: which last was done by fanning and agitating the air round the thing to be purified. Some of these lustrations were necessary, *i. e.* could not be dispensed with, as lustrations of houses in time of a plague, or upon the death of any person: others again were done out of choice, and at pleasure. The public lustrations at Rome were celebrated every fifth year; in which they led a victim thrice round the place to be purified, and in the mean time burnt a great quantity of perfumes. Their country lustrations, which they called *ambarvalia*, were celebrated before they began to reap their corn: in those of the armies, which they called *armilustria*, some chosen soldiers, crowned with laurel, led the victims, which were a cow, a sheep, and a bull, thrice round the army ranged in battle-array in the field of Mars, to which deity the victims were afterwards sacrificed, after pouring out many imprecations upon the enemies of the Romans. The lustrations of their flocks were performed in this manner: the shepherd sprinkled them with pure water, and thrice surrounded his sheepfold with a composition of savin, laurel, and brimstone set on fire; and afterwards sacrificed to the goddess Pales an offering of milk boiled, wine, a cake, and millet. As for private houses, they were lustrated with water, a fumigation of laurel, juniper, olive-tree, savin, and such like; and the victim commonly was a pig. Lustrations made for particular persons were commonly called *expiations*, and the victims *piacula*.

LU'STRE. *s.* (*lustre*, French.) 1. Brightness; splendour; glitter (*Davies*). 2. A sconce with lights (*Pope*). 3. Eminence; renown (Swift). 4. The space of five years.

LU'STRING. *s.* (from *lustre.*) A shining silk.

LU'STROUS. *a.* (from *lustre.*) Bright; shining; luminous (*Shakspeare*).

LUSTRUM, in Roman antiquity, a general muster and review of all the citizens and their goods, which was performed by the censors every fifth year. They afterwards made a solemn lustration.

LU'STY. *a.* (*lustig*, Dutch.) Stout; vigorous; healthy; able of body (*Otway*).

LU'TANIST. *s.* (from *lute.*) One who plays upon the lute.

LUTA'RIOUS. *a.* (*lutarius*, Latin.) 1. Living in mud. 2. Of the colour of mud (*Grew*).

LUTE, in music, a stringed instrument formerly much in use; anciently containing only five rows of strings, but to which six, or more, were afterwards added. The *Lute* consists of four parts, *viz.* the table; the body, which has nine or ten sides; the neck, which has as many stops or divisions; and the head, or cross, in which the screws for tuning it are inserted. In playing this instrument, the performer strikes the strings with the fingers of the right hand, and regulates the sounds with those of the left. The origin of this instrument is not known, though generally believed to be of very early date. Indeed, authors are not agreed as to the country to which we are indebted for its invention. Some give it to Germany, and derive its name from the German word *Latue*, which signifies the same thing, while others ascribe it to the Arabians, and trace its name from the Arabic *Alland*.

LUTES, in chemistry, (*Lutum*, clay, Lat.) Clay or substances of similar tenacity, made use of to close the joinings of chemical vessels, in order to prevent the escape of vapours and gasses during the process of distillation, sublimation, and the like; or to protect vessels from the action of the fire which might crack or fuse, or calcine them;

or sometimes to repair flaws or other imperfections. Hence lutes are chemical *cements*. See the article CEMENT.

When a lute is applied over the whole surface of a vessel (as to a glass retort when it is intended to be heated red-hot), the process is termed *lorication*, or coating. Iron furnaces are also lined or coated on the inside with earth to prevent the iron from being destroyed by the constant action of the fire.

From the vast variety of receipts for lutes, the following may be selected as best capable of answering the purposes of the experimental chemist.

To prevent the escape of the vapours of water, spirit, and liquors not corrosive, the simple application of slips of moistened bladder will answer very well for glass, and paper with good paste for metals. Bladder to be very adhesive should be soaked some time in water moderately warm, till it feels clammy; it then sticks very well. If smeared with white of egg instead of water it adheres still closer.

Another very convenient lute is linseed-meal moistened with water to a proper consistence, well-beaten, and applied pretty thick over the joinings of the vessels. This immediately renders them light, and the lute in some hours dries to a hard mass. Almond-paste will answer the same purpose. These, however, both begin to scorch and spoil at a heat something about boiling, and therefore will not do as *fire-lutes*, a number of very cohesive cements impervious to water and most liquids and most vapours, and extremely hard when once solidified, are made by the union of quick-lime with many of the vegetable or animal mucilaginous liquors. The following is in frequent use: Take some whites of eggs with as much water, beat them well together, and sprinkle in sufficient slacked lime to make up the whole to the consistence of thin paste. The lime should be slacked by being once dipped in water, and then suffered to fall into powder, which it will do speedily with great emission of heat if well burnt. This cement should be spread on slips of cloth, and applied immediately, as it hardens or eats very speedily. A strong solution of glue may be employed with the lime instead of the white of eggs. A mixture of liquid glue, white of eggs and lime makes the *lute d'ane*, which is so firm that broken vessels united with it are almost as strong as when sound. None of these lutes, however, will enable these vessels to hold liquids for any great length of time.

A very singular and firm lute is obtained by rubbing down some of the poorest skimmed milk cheese with water to the consistency of thick soup, and then adding lime and applying as above.

Lime and blood with a small quantity of brick-dust or broken pottery stirred in is used in some places as a very good water-cement for cellars and other places liable to damp.

None of these lutes will confine very corrosive acid vapours perfectly for a great length of time, but they will bear nearly a red-heat, and may be employed where an apparatus is required to be air-tight.

For confining acid vapours the *fat lute*, as it is called, is one of the best. This is made by taking any quantity of good clay, tobacco-pipe clay for example, thoroughly dry, but not burnt, powdering it in an iron mortar, mixing it gradually, with *drying* linseed-oil, and beating them for a long time to the consistence of thick paste. Much manual labour is required, and it should be continued till the mass no longer adheres to the pestle. Then make the edges of the glass or other vessels about which it is to be used perfectly dry, and apply the lute carefully, and it will stand the longest process without failing. Good glazier's putty, which is made of chalk beat up with drying linseed oil, much resembles the fat lute in quality.

The following will be found useful, applied round glass retorts when distillation with a full red heat is wanted to protect them from the sudden action of the fire, and to give them firmness, and enable them to bear this heat without flattening or falling together when red-hot, or melting with the fuel; and a glass vessel so prepared with a thick earthen coating, may be considered as an earthen vessel glazed on the inside. Let sand be mixt with just sufficient quantity of clay to make it adhere together, and beat them up with some fibrous material, so as mechanically to increase the tenacity. A natural earthy mixture of this kind is Windsor loam, or an equally good one may be formed with fragments of pottery coarsely ground, (the fine part being separated by sifting and rejected), mixed with more or less clay according to the quality, so that it will just mould together when wet. For the fibrous matter some use horses' dung, which appears the best, others chopped straw or chaff, and cow-hair or tow, all of which answer the same purpose. Beaumé recommends about an ounce of cow's hair to five pounds of the earthy mixture.

For joining the covers to crucibles, a very valuable lute is prepared from glass of borax, brick-dust, and clay, finely powdered together, and mixed with a little water when used. About a sixth part of borax is sufficient to bring the earths to that state of semi-vitrification which is desired. Litharge may be used instead of borax, but the latter is by far the best, as it promotes that thin spreading fusion, which is admirably calculated for an even application down an uneven surface.

Another species of lute is what the French call *Mastich chaud*, and consists of different kinds of oily and resinous substances, liquid when hot, and which become more or less

solid by cooling. These are useful for a variety of miscellaneous purposes; for experiments with gasses over water or mercury, and others where only a very moderate warmth is used, and where it is of importance to keep out air and water. These will also confine acid vapours, but not the vapours of alkohol, turpentine, or essential oils which dissolve most resinous substances. The greater number of these will stick very well to glass, of these cements common sealing-wax is one of the most useful. But a cheaper and less brittle cement is made simply by melting bees-wax with abont one-eighth of common turpentine.

The use of gum-arabic dissolved in water for cementing paper-labels to bottles, and a great variety of miscellaneous purposes is known to every one. A still better cement for the same uses is isinglass dissolved in vinegar to a pretty thick consistence when warm. This congeals in cooling, and before it is used it should be gently warmed.

Many of the varnishes and oil paints are employed in rendering vessels air and water tight. Thus when canvas bags are fastened to a stop-cork tube for air-holders, the joining is made perfectly tight by tying over it slips of cloth or bladder soaked in spirit varnish.

Yet after all, from the inconveniency of making lutes, and often of their application when made it is far better and saves much time to the chemist to fit glass vessels to each other by grinding, whence this practice is much more in use now than formerly.

*To* Lute. *v. a.* To close with a luting.

LUTEA CORPORÆ. See Corpora *Lutea.*

LUTENIST, a performer on the lute. The office of the *Lutenist* to the king's chapel was formerly an active one, like that of organist; but since the lute has fallen into disuse, this has become a sinecure place.

LUTETIA, now *Paris*, a town of Belgic Gaul, on the confluence of the rivers Sequana and Matrona. J. Cæsar fortified and embellished it, from which circumstance some authors call it *Julii Civitas.* Julian, the apostate, resided there some time. *Cæs. Strab.*

LUTHER (Martin), the great luminary of the reformation, was born at Isleben in Saxony, of mean parentage, in 1483. In 1501 he was sent to the university of Erfurt, where he studied philosophy and the civil law, with a view of rising at the bar, but happening to walk one day into the fields, his companion was struck with lightning, and died on the spot. This affecting incident operated so much on the mind of Luther, that he determined on withdrawing from secular concerns, and to retire into a monastery. He chose the order of St. Augustine, and led in the convent a most pious and studious life. Having met with a copy of the Latin Bible, he set himself to the study of it with great application, and was surprised to see the difference between the word of God, and the practices of the Roman church. In 1512 he was deputed to go to Rome on some business appertaining to his order, and there had an opportunity of seeing more plainly the corruptions of popery. On his return he was created D. D. and became professor of divinity at Wittemberg, a new university founded by Frederic elector of Saxony. In 1517 Leo X. published general indulgences in order to complete his magnificent buildings at Rome. These pardons for all sorts of sins, present and to come, were sold in Germany by the dominicans in the most shameful manner, and gave great offence to all religious persons, and to Luther in particular, who published a Thesis on Indulgences at Wittemberg, consisting of 95 propositions, in which he exposed this odious traffic, and totally denied the efficacy of indulgences. These propositions were opposed at Frankfort by Tetzel, the papal agent; but the generality of the people gave credit to the opinions of Luther, and the dispute made so much noise, that other divines engaged in the controversy. At length matters began to grow serious, and the ecclesiastics made a formal complaint to the pope, who made light of a quarrel between a few monks, and neglected to put his authority in force on the occasion. But the emperor Maximilian seeing the dispute running fast through all Germany, applied to Leo to put a stop to it, on which he ordered Luther to be cited to Rome within 60 days. He also called upon the elector of Saxony to give up the reformer to his legate. This prince, however, had too great a regard for Luther to obey the injunction, and requested that his cause might be heard in Germany. To this the pope assented, and cardinal Cajetan was appointed to decide the business. Luther accordingly appeared before the cardinal at Augsburg: but finding that he was required to make a full submission and reconciliation, his honest spirit took fire, and he positively refused, though all the terrors of the church were denounced against him. The pope upon this issued a brief, in which he threatened to excommunicate all who denied his power to forgive sins by indulgences. Luther, not at all daunted by this bull published an appeal from the pope to a general council. By this time the opinions of Luther had gained him many followers, and among the rest the learned Melancthon, whose advice was of great service to him. Pains were taken to bring over Erasmus also, but though he wished well to the work of reformation, he had not courage to break with the pope. In 1519 Luther had a famous dispute at Leipsic with John Eccius, divinity professor at Ingoldstadt, which ended in the manner common to those kind of conferences, neither party being convinced of the others' arguments. In 1520 the pope issued out a formal condemnation of Luther, which affected him so little that he immediately wrote a book, in which he called it "the Execrable Bull of Antichrist;" and calling all the students of Wittemberg together, he flung the pope's bull and decretals into the fire. The year following he attended the diet of Worms by virtue of a safe-conduct from the emperor, and when some of his friends would have dissuaded him from going, by urging the case of John Huss, he boldly said, that "If he knew there were as many devils at Worms as tiles upon the houses he would go." Here he was required to retract his opinions, and to promise submission to the pope, both of which he refused, and left the city without a single step being advanced in the way of reconciliation. On his return through a wood, he was suddenly seized

by a party of horsemen, who conveyed him to the castle of Wittemberg, where he was so secretly kept, that no one knew what was become of him, except the persons concerned in the affair. In the mean time Charles V. published an edict against him, and put under the ban of the empire all who should maintain, defend, or protect him. While this bull was thundering through the empire, Luther was secure in his retreat, which he afterwards called his hermitage and his Patmos. He did not, however, spend his time in idleness, but held conferences with his friends on the cause in which they were engaged, and wrote several books against his enemies. After an absence of ten months he made his appearance again publicly at Wittemberg, and about this time entered into a controversy with Henry VIII. of England, who had written a book against him on the Sacrament. Luther paid very little respect to the royal disputant, but answered him with great severity. This year he published a translation of the New Testament into German, which promoted the reformation wonderfully, and was universally read, though proscribed by imperial authority. In 1524 Erasmus was prevailed upon to write against Luther, and chose for his subject the freedom of the human will, which he defended against our reformer, who replied in a treatise entitled, De Servio Abitrio, which was answered by Erasmus in another called, Hyperaspistes. In 1525 Luther married Catherine de Bore, a nun, who had escaped from a convent at Nimptschen. This gave a handle to his enemies to accuse him of immorality and impiety; but Luther was not to be abashed by their charges. He defended what he had done, and lived happily with his wife, who brought him three sons. In 1529 the emperor called a diet at Spires, to call for aid from the German princes against the Turks, and to devise some means to allay the religious disputes which raged more violently than ever, and in which it was decreed, that the mass should be observed in all those places which professed the reformed religion. Against this decree the electors of Saxony and Brandenburg, and other princes made their protest in a famous writing, which brought upon the reformed the name of protestants. The protestant princes then found it expedient to enter into a league for their mutual defence against the emperor and catholic princes. In 1530 was drawn up by Melancthon the celebrated confession of Augsburg, which gave great satisfaction to Luther, and was received as the standard of the protestant faith in Germany. In 1534 Luther's translation of the Bible into German was printed, and published the year following. In 1537 an assembly was held at Smalcald about religion, at which Luther and Melancthon were present. At this meeting Luther was seized with so severe an attack of the stone that his life was despaired of. However it pleased God to recover him, and he went on as before, writing books, and labouring to promote the great work for which he was raised up by Providence. He died at Isleben in 1546, and his body was removed to Wittemberg, where it was interred with great pomp, being attended by princes, earls, nobles, and a great number of private gentlemen and students. "Martin Luther's life," says bishop Atterbury, "was a continual warfare; he was engaged against the united forces of the papal world, and he stood the shock of them bravely, both with courage and success. He was a man certainly of high endowments of mind and great virtues; he had a vast understanding, which raised him up to a pitch of learning unknown to the age in which he lived; his knowledge in Scripture was admirable, his elocution manly, and his way of reasoning with all the subtilty that these plain truths he delivered would bear; his thoughts were bent always on great designs, and he had a resolution fitted to go through with them; the assurance of his mind was not to be shaken or surprised; and that παρρησια of his (for I know not what else to call it), before the diet of Worms, was such as might have become the days of the apostles. His life was holy; and when he had leisure for retirement, severe; his virtues active chiefly, and homilitical, not those lazy sullen ones of the cloister. He had no ambition but in the service of God; for other things, neither his enjoyment nor wishes ever went higher than the bare conveniences of living. He was of a temper particularly averse to covetousness, or any base sin; and charitable even to a fault, without respect to his own occasions. If among this crowd of virtues a failing crept in, we must remember that an apostle himself had not been irreproachable; if in the body of his doctrine one flaw is to be seen, yet the greatest lights of the church, and in the purest times of it, were, we know, not exact in all their opinions. Upon the whole, we have certainly great reason to break out in the phrase of the prophet, and say, "How beautiful upon the mountains are the feet of him that bringeth glad tidings." His works we collected into 7 vols. folio, at Wittemberg after his death. Catharine de Bore survived him, and died of a fall from a carriage at Torgau in 1552. Some of their descendants were living in good repute at the close of the 17th century.

The late Dr. Campbell in his "Lectures on Ecclesiastical History," says "Luther had certainly great qualities and virtues; he had also great faults: but the former much preponderated. His penetration and abilities were considerable. I mean his knowledge, his eloquence, his skill in disputation, and his readiness in finding resources, even in the greatest difficulties. But these are only intellectual talents; he was largely supplied with those active virtues, which are necessary for putting the afore-named qualities to the best account. An unconquerable zeal for what he believed to be truth, constancy in maintaining it, intrepidity in facing danger, an indefatigable industry in employing every opportunity that offered for exposing error and superstition, and defending what he thought the unadulterated religion of Jesus Christ. But his virtues were not without defects: nay, his great qualities themselves were not untainted with those vices to which they are thought to bear an affinity. Thus his logical acuteness sometimes degenerated into chicane. But this was the fault of the age he lived in, and of his education. His zeal and the warmth of his temper often betrayed him into an unjustifiable violence. His magnanimity was not untinctured with pride and resentment. His transports of rage, and even his buffooneries against the pope, did unspeakable injury to his cause with the wiser and more intelligent part of mankind; even with those who desired nothing more ardently than a reformation from the corruptions which prevailed, and a defence of Cristian liberty against the too well established tyranny of ecclesiastical superiors. His perseverance would, perhaps, on some occasions, be

more properly termed obstinacy. When he had once publicly supported a tenet, he seemed incapable of lending an impartial ear to any thing advanced in opposition to it. In short, what he did, and what he was, notwithstanding his errors, justly merit our admiration; especially when we consider the times in which, and the people amonst whom, he lived; I may add, the kind of education he had obtained." See REFORMATION.

The grand and leading doctrine of Lutheranism, and that on which the permanent foundation of the reformation was laid, is the right of private judgment in matters of religion. "To the defence of this proposition," says Mr. Roscoe, the biographer of Leo the Tenth, "Luther was at all times ready to devote his learning, his talents, his repose, his character, and his life; and the great and imperishable merit of this reformer consists in his having demonstrated it by such arguments, as neither the efforts of his adversaries, nor his own subsequent conduct, have been able either to confute or invalidate."

It would be unjust were we to withhold the following account given by Luther himself of the progress he made in his great work:

"Before all things, says he, I entreat you pious reader, for our Lord Jesus Christ's sake to read my writings with cool consideration, and even with much pity. I wish you to know that when I began the affair of indulgencies, at the very first, I was a monk, and a most mad papist. So intoxicated was I, and drenched in papal dogmas, that I would have been most ready at all times to murder, or assist others in murdering, any person who should utter a syllable against the duty of obedience to the pope. I was a complete SAUL; and there are many such yet. There were, however, and are now, others who appear to me to adhere to the pope on the principle of Epicurus; that is, for the sake of indulging their appetites; when secretly they even deride him, and are as cold as ice if called upon to defend the papacy. I was never one of these; I was always a sincere believer; I was always earnest in defending the doctrines I professed: I went seriously to work as one who had a horrible dread of the day of judgment, and who, from his inmost soul was anxious for salvation. You will find, therefore, in my earlier writings, with how much humilty, on many occasions, I gave up very considerable points to the pope, which I now detest as blasphemous and abominable in the highest degree. This error my slanderers call inconsistency; but you, pious readers will have the kindness to make some allowance, on account of the times, and my inexperience. I stood absolutely alone at first; and certainly I was very unlearned, and very unfit to undertake matters of such vast importance. It was by accident, not willingly or by design, that I fell into these violent disputes; God is my witness."

LUTHERANISM, the sentiment of Martin Luther with regard to religion. See LUTHER. Lutheranism has undergone some alterations since the time of its founder.—Luther rejected the epistle of St. James, as inconsistent with the doctrine of St. Paul, in relation to justification; he also set aside the Apocalypse: both which are now received as canonical in the Lutheran church.

Luther reduced the number of sacraments to two viz. baptism, and the eucharist: but he believed the impanation, or consubstantiation, that is, that the matter of the bread and wine remain with the body and blood of Christ; and it is in this article that the main difference between the Lutheran and English churches consists.

Luther maintained the mass to be no sacrifice; exploded the adoration of the host, auricular confession, meritorious works, indulgencies, purgatory, the worship of images, &c. which had been introduced in the corrupt times of the Romish church. He also opposed the doctrine of free-will, maintained predestination, and asserted our justification to be solely by the imputation of the merits and satisfaction of Christ. He also opposed the fastings in the Romish church, monastical vows, the celibate of the clergy, &c.

LUTHERANS, the Christians who follow the opinions of Martin Luther, one of the principal reformers of the church in the 16th century. See LUTHER. The Lutherans, of all Protestants, are those who differ least from the Romish church; as they affirm that the body and blood of Christ are materially present in the sacrament of the Lord's supper, though in an incomprehensible manner; and likewise represent some religious rites and institutions, as the use of images in churches, the distinguishing vestments of the clergy, the private confession of sins, the use of wafers in the administration of the Lord's supper, the form of exorcism in the celebration of baptism, and other ceremonies of the like nature, as tolerable, and some of them as useful. The Lutherans maintain, with regard to the divine decrees, that they respect the salvation or misery of men, in consequence of a previous knowledge of their sentiments and characters, and not as free and unconditional, and as founded on the mere will of God. Towards the close of the 17th century, the Lutherans began to entertain a greater liberality of sentiment than they had before adopted; though in many places they persevered longer in severe and despotic principles than other Protestant churches. Their public teachers now enjoy an unbounded liberty of dissenting from the decisions of those symbols or creeds which were once deemed almost infallible rules of faith and practice, and of declaring their dissent in the manner they judge most expedient. Mosheim attributes this change in their sentiments to the maxim which they generally adopted, that Christians were accountable to God alone for their religious opinions; and that no individual could be justly punished by the magistrate for his erroneous opinions, while he conducted himself like a virtuous and obedient subject, and made no attempts to disturb the peace and order of civil society.

Luther taught the religious world, that the mind of man cannot be subjected to the imperious decrees of fallible councils and human power, and the result was glorious.

The human mind, delivered from the external constraint imposed upon it by hierarchical despotisms, and from the external constraint of the apathy in which it was kept by a blind superstition, soon found itself emancipated from guardianship, and began to make a free, energetic, and proper use of its faculties. The documents of religion were subjected to a profound criticism; and, as the study of the fathers and councils were connected with the decretals of antiquity, history, and languages, the great object of classical learning began to assume a new aspect, and to be illuminated by a new light. The scholastic philosophy found in the Lutherans most formidable adversaries, who unveiled its vices, and attacked its weak sides. The torch of reason, which had too long smothered in the recesses of the cloister, and glimmered in the cells of the monks, was no sooner admitted to the re-animating atmosphere of freedom and philosophy, than it began to shine forth in its native lustre. The empty science of the casuists vanished before the morality of the gospel; the superstitious rites and absurd creed of the Romanists, gave way to the simple unadorned religion of many of the reformed churches, and to the consoling and *operating* doctrine of the Christian dispensation, as revealed in the Scriptures.

LUTHERN, in architecture, a kind of window over the cornice, in the roof of a building; standing perpendicularly over the naked of a wall, and serving to illuminate the upper story. Lutherns are of various forms; as square, semicircular, round, called bull's eyes, flat arches, &c.

LUTRA, in zoology. See MUSTELA.

LUTTI (BENEDITTO), an eminent painter, born at Florence in 1666. He was the disciple of Antonio Dominico Gabiani, and his merit was judged equal to that of his master: he painted few besides easel pieces; and his works were much valued and sought for in England, France, and Germany. The Emperor knighted him; and the elector of Mentz, together with his patent of knighthood, sent him a cross set with diamonds. Lutti was never satisfied in finishing his pictures; yet though he often retouched them, they never appeared laboured. He died in 1724.

LUTULENT. *a.* (*lutulentus*, Lat.) Muddy; turbid.

LUTZEN, a town of Upper Saxony in Germany; famous for a battle fought here in 1632, when Gustavus Adolphus king of Sweden was killed. It is situated on the river Elster, in Lon. 12. 7. E. Lat. 51. 24. N.

LUTZENSTEIN, a town of France, in the the department of Lower Rhine, with a strong castle, seated on a mountain, 30 miles north west of Strasburg. Lon. 7. 17. E. Lat. 48. 55. N.

*To* LUX. / *To* LUX'ATE. } *v. a.* (*luxo*, Lat.) To put out of joint; to disjoint (*Wisem.*)

LUXA'TION. *s.* (from *luxo*, Latin.) 1. The act of disjointing. 2. Any thing disjointed. (*Floyer*).

LUXE. *s.* (French; *luxus*, Lat.) Luxury; voluptuousness: not used (*Prior*).

LUXEMBURG, a duchy of the Austrian Netherlands; bounded on the east by Treves, on the south by Lorrain, on the west by Champagne and Liege, and on the north by Liege and Limburg. It lies in the forest of Ardennes, and in some places is covered with mountains and woods; but in general it is fertile in corn and wine, and has a great number of iron mines. The principal rivers are the Moselle, Sour, Ourte, and Semoy.

LUXEMBURG, a city of the Austrian Netherlands, capital of a duchy of the same name. It was more than once taken and retaken in the wars of the 16th century. In 1684, it was taken by the French who augmented the fortifications so much, that it was one of the strongest places in Europe. In this condition, it was restored to the Spaniards in 1697; retaken by the French in 1701; given to the Dutch, as a barrier town, in 1713; but ceded to the house of Austria in 1715. In the present war, it surrendered to the French in 1795. It is divided by the Alsitz into the upper and lower towns; the former, almost quite surrounded by rocks, but the lower seated in a plain. It is 25 miles south west of Treves, and 100 west of Mentz. Lon. 6. 17. E. Lat. 49. 37. N.

LUXEUIL, a town of France, in the department of Upper Saone, remarkable for its mineral waters. From the number of urns, medals, and inscriptions, found here, it is supposed to have been a considerable place in the time of the Romans. It was destroyed by Atilla, in 450. Near the town was a late celebrated abbey, founded by St. Columban, an Irishman. It is seated at the foot of the Vosges, 15 miles west of Vesoul. Lon. 6. 24. E. Lat. 47. 50. N.

LUXU'RIANCE. / LUXU'RIANCY. } *s.* (from *luxurians*, Lat.) exuberance; abundant or wanton plenty of growth (*Spectator*).

LUXU'RIANT. *a.* (*luxurians*, Latin.) Exuberant; superfluously plenteous (*Milton*).

LUXURIANT, in botany applied to the flower. Tegmenta fructificationis ita multiplicat, ut essentiales ejusdem partes destruantur. A corol that multiplies the covers of the fructification so as to destroy the essential parts.—Luxuriancy is either multiplicate, full or proliferous. All luxuriant flowers are monsters; but full flowers only (Pleni) are absolutely barren.

*To* LUXU'RIATE. *v. n.* (*luxurior*, Latin.) To grow exuberantly; to shoot with superfluous plenty.

LUXU'RIOUS. *a.* (*luxurieux*, French, *luxuriosus*, Latin.) 1. Delighting in the pleasures of the table. 2. Administring to luxury (*Milton*). 3. Lustful; libidinous (*Shaksp.*) 4. Voluptuous; enslaved to pleasure (*Milton*). 5. Softening by pleasure (*Dryden*). 6. Luxuriant; exuberant (*Milton*).

LUXU'RIOUSLY. *ad.* (from *luxurious.*) Deliciously; voluptuously (*Shakspeare*).

LU'XURY. *s.* (*luxuria*, Latin.) 1. Voluptuousness; addictedness to pleasure (*Milton*). 2. Lust; lewdness (*Shakspeare*). 3. Luxuriance; exuberance (*Bacon*). 4. Delicious fare (*Addison*).

Lu'xury, among the Romans, prevailed to such a degree, that several laws were made to suppress, or at least limit it. The extravagance of the table began about the time of the battle of Actium, and continued in great excess till the reign of Galba. Peacocks, cranes of Malta, nightingales, venison, wild and tame fowl, were considered as delicacies. A profusion of provisions was the reigning taste. Whole wild boars were often served up, and sometimes they were filled with various small animals, and birds of different kinds: this dish they called the Trojan horse, in allusion to the wooden horse filled with soldiers. Fowls and game of all sorts were served up in whole pyramids, piled up in dishes as broad as moderate tables. Lucullus had a particular name for each apartment; and in whatever room he ordered his servants to prepare the entertainment, they knew by the direction the expence to which they were to go. When he supped in the Apollo, the expence was fixed at 50,000 drachmæ, that is 1250l. M. Antony provided eight boars for 12 guests. Vitellius had a large silver platter, said to have cost a million of sesterces, called Minerva's buckler. In this he blended together the livers of gilt-heads, the brains of pheasants and peacocks, the tongues of phenicopters, and the milts of lampreys. Caligula served up to his guests pearls of great value dissolved in vinegar; the same was done also by Clodius the son of Æsop the tragedian. Apicius laid aside 90,000,000 of sesterces, besides a migthy revenue, for no other purpose than to be sacrificed to luxury; finding himself involved in debt, he looked over his accounts, and though he had the sum of 10,000,000 of sesterces still left, he poisoned himself for fear of being starved to death.

The Roman laws to restrain luxury were Lex Orchia, Fannia, Didia, Licinia, Cornelia, and many others; but all these were too little; for, as riches increased amongst them, so did sensuality.

What were the ideas of luxury entertained in England about two centuries ago, may be gathered from the following passage of Holingshed; who, in the discourse prefixed to his history, speaking of the increase of luxury, says, "Neither do I speak this in reproach of any man, God is my judge; but to shew, that I do rejoice rather to see how God has blessed us with his good gifts, and to behold how that in a time wherein all things are grown to the most excessive prices, we yet do find means to obtain and achieve such furniture as heretofore was impossible. There are old men yet dwelling in the village where I remain, which have noted three things to be marvellously altered in England within their sound remembrance. One is the multitude of chimneys lately erected; whereas in their young days there were not above two or three, if so many, in most uplandish towns of the realm (the religious houses, and manor places of their lords, always excepted, and peradventure some great personages), but each made his fire against a reredoss (skreen) in the hall where he dressed his meat and dined.—The second is the great amendment of lodging; for, said they, our fathers and we ourselves have lain full oft upon straw pallets covered only with a sheet, under coverlets made of a dogswaine or horharriots (to use their own terms), and a good log under their head instead of a bolster.—If it were so that the father or good man of the house had a mattress, or flock bed and sheets, a sack of chaff to rest his head upon, he thought himself to be as well lodged as the lord of the town. So well were they contented, that pillows (said they) were thought meet only for women in childbed: as for servants, if they had any sheet above them, it was well; for seldom had they any under their bodies to keep the pricking straws, that ran oft through the canvas and their hardened hides.—The third thing they tell of, is the exchange of treene (wooden) platters into pewter, and wooden spoons into silver or tin; for so common were all sorts of treene vessels in old times, that a man should hardly find four pieces of pewter (of which one was peradventure a salt) in a good farmer's house. Again, in times past, men were contented to dwell in houses builded of sallow, willow, &c. so that the use of oak was in a manner dedicated wholly unto churches, religious houses, princes palaces, navigation, &c. But now willow, &c. are rejected, and nothing but oak any where regarded; and yet see the change, for *when our houses were builded of willow, then we had oaken men; but now that our houses are come to be made of oak, our men are not only become willow, but a great many altogether of straw, which is a sore alteration.* In these, the courage of the owner was a sufficient defence to keep the house in safety; but now the assurance of the timber must defend the men from robbing. Now have we many chimneys, and yet our tenderlins complain of rheums, catarrhs, and poses; then had we none but reredoses, and our heads did never ach. For as the smoke in those days were supposed to be a sufficient hardening for the timber of the house; so it was reputed a far better medicine to keep the good man and his family from the quacks or pose; wherewith, as then, very few were acquainted. Again, our pewterers in time past employed the use of pewter only upon dishes and pots, and a few other trifles for service; whereas now they are grown into such exquisite cunning, that they can in a manner imitate by infusion any form or fashion, of cup, dish, salt-bowl, or goblet, which is made by the

goldsmiths craft, though they be ever so curious and very artificially forged. In some places beyond the sea, a garnish of good flat English pewter (I say flat, because dishes and platters in my time began to be made deep, and like basons, and are indeed more convenient both for sauce and keeping the meat warm) is esteemed so precious as the like number of vessels that are made of fine silver."

Particular instances of luxury in eating, however, might be adduced from an earlier period, surpassing even the extravagance of the Romans. Thus, in the 10th year of the reign of Edward IV. 1470, George Nevill, brother to the earl of Warwick, at his instalment into the archiepiscopal see of York, entertained most of the nobility and principal clergy, when his bill of fare was 300 quarters of wheat, 350 tuns of ale, 104 tuns of wine, a pipe of spiced wine, 80 fat oxen, six wild bulls, 1004 wethers, 300 hogs, 300 calves, 3000 geese, 3000 capons, 300 pigs, 100 peacocks, 200 cranes, 200 kids, 2000 chickens, 4000 pigeons, 4000 rabbits, 204 bitterns, 4000 ducks, 200 pheasants, 500 partridges, 2000 woodcocks, 400 plovers, 100 curlews, 100 quails, 1000 egrets, 200 rees, 400 bucks, does, and roebucks, 1506 hot venison pasties, 4000 cold ditto, 1000 dishes of jelly parted, 4000 dishes of jelly plain, 4000 cold custards, 2000 hot custards, 300 pikes, 300 breams, eight seals, four porpusses, 400 tarts. At this feast the earl of Warwick was steward, the earl of Bedford treasurer, and Lord Hastings comptroller, with many more noble officers: 1000 servitors, 62 cooks, 515 menial apparitors in the kitchen.—But such was the fortune of the man, that after his extreme prodigality he died in the most abject but unpitied poverty, *vinctus jacuit in summa inopia.*

And as to dress, luxury in that article seems to have attained a great height long before Holingshed's time: for in the reign of Edward III. we find no fewer than seven sumptuary laws passed in one session of parliament to restrain it. It was enacted, that men servants of lords, as also of tradesmen and artisans, shall be content with one meal of fish or flesh every day; and the other meals, daily, shall be of milk, cheese, butter, and the like. Neither shall they use any ornaments of gold, silk or embroidery; nor their wives and daughters any veils above the price of twelve-pence. Artisans and yeomen shall not wear cloth above 40s. the whole piece (the finest then being about 6l. per piece), nor the ornaments before named. Nor the women any veils of silk, but only those of thread made in England. Gentlemen under the degree of knights, not having 100l. yearly in land, shall not wear any cloth above 4½ marks the whole piece. Neither shall they nor their females use cloth of gold, silver, or embroidery, &c. But esquires having 200l. per annum or upwards of rent, may wear cloths of five marks the whole piece of cloth; and they and their females may also wear stuff of silk, silver, ribbons, girdles, or furs. Merchants, citizens, burghers, and artificers of tradesmen, as well of London as elsewhere, who have goods and chattles of the clear value of 500l. and their females may wear as is allowed to gentlemen and esquires of 100l. per annum. And merchants, citizens, and burgesses, worth above 1000l. in goods and chattles, may (and their females) wear the same as gentlemen of 200l. per annum. Knights of 200 marks yearly may wear cloth of six marks the cloth, but no higher; but no cloth of gold, nor furred with ermine; but all nights and ladies having above 400 marks yearly, up to 1000l. per annum, may wear as they please, ermine excepted; and they may wear ornaments of pearl and precious stones for their heads only. Clerks having degrees in cathedrals, colleges, &c. may wear as knights and esquires of the same income. Plowmen, carters, shepherds, and such like, not having 40s. value in goods or chattles, shall wear no sort of cloth but blanket and russet lawn of 12d. and shall wear girdles and belts: and they shall only eat and drink suitable to their stations. And whosoever uses other apparel than is prescribed by the above laws, shall forfeit the same.

LUZARCHES, a town of France, in the department of Seine and Oise, 15 miles north of Paris. Lon. 2. 19. E. Lat. 49. 7. N.

LUZERNE, a county of Pennsylvania, 80 miles long and 61 broad. In 1790, it contained 4,904 inhabitants. Wilkesborough is the capital.

LUZZANA, a town of Italy, in the Mantuan, 22 miles south of Mantua. Lon. 10. 48. E. Lat. 44. 50. N.

LUZZARA, a strong town of Italy, on the confines of the duchies of Mantua and Guastalla, near the confluence of the Crostolo with the Po. Here a battle was fought between the French and Spaniards, in 1702, when each side claimed the victory. It is 10 miles south of Mantua. Lon. 10. 50. E. Lat. 45. 0. N.

LY. When *ly* terminates the name of a place, it is derived from leag, Sax. a field: when it ends an adjective or adverb, it is contracted from *lich*, *like*; as *beastly*, *beastlike*.

LYÆUS, a surname of Bacchus. It is derived from λυειν, *solvere*, because wine, over which Bacchus presides, gives freedom to the mind, and delivers it from all cares and melancholy.

LYBIA. See Libyæ.

Lybia, in mastiology. See Felis.

LYCÆA, festivals in Arcadia, in honour of Pan, the god of shepherds, the same as the Lupercalia of the Romans.—A festival at Argos, in honour of Apollo Lycæus, who delivered the Argives from wolves, &c.

LYCÆUM, a celebrated place near the banks of the Ilissus, in Attica, where Aristotle taught philosophy.

LYCÆUS, a mountain of Arcadia, sacred to Jupiter. It was also sacred to Pan. *Virgil*, &c.

LYCAMBES, the father of Neobule, promised his daughter in marriage to the poet Archilochus, and afterwards refused to fulfil his engagement. This irritated Archilochus; he wrote a bitter invective against Lycambes and his daughter, and rendered them both so desperate by the satire of his composition, that they hanged themselves.

LYCA'NTHROPY. *s.* (λύκος and ἄνθρωπος). A kind of madness, in which men have the qualities of wild beasts (*Taylor*).

LYCA'ON, the first king of Arcadia, son of Pelasgus and Meliboea. He was succeeded on the throne by his eldest son Nyctimus. He lived about 1820 years before the Christian era. 2. Another king of Arcadia, celebrated for his cruelties. He was changed into a wolf by Jupiter, because, when Jupiter visited the earth to punish the wickedness and impiety of mortals, he, in order to try the divinity of the god, served up human flesh on his table. 3. A son of Priam and Laothe. He was taken by Achilles, and carried to Lemnos, whence he escaped. He was afterwards killed by Achilles, in the Trojan war.

LYCAONIA, a country of Asia, between Cappadocia, Pisidia, Pamphylia, and Phrygia, made a Roman province under Augustus.—Arcadia bore also that name from one of its kings.

LYCASTE, an ancient town of Crete, whose inhabitants accompanied Idomeneus to the Trojan war. 2. A famous courtezan of Drepanum, called Venus, on account of her great beauty. She had a son called Eryx, by Butes, son of Amycus.

LYCHANOIDES. (*Greek.*) The name given by the ancients to the middle sound of those which Bacchius and other Greek writers call *spissi*. See Spissus.

LYCHNIDEA, in botany. See Phlox.

LYCHNIS. Campion. In botany, a genus of the class decandria order, pentagynia. Calyx one-leafed, oblong; petals five with claws; the border mostly divided; capsule superior, one or five-celled, with a five-toothed orifice. Eleven species, chiefly European, a few Asiatic; three common to the dry rocks or wet meadows of our own country. 1. Lychnis, with flowers gathered into a pyramid, commonly called Scarlet Lychnis. 2. Lychnis, with quadrifid petals, and a roundish fruit, commonly called Ragged Robin. 3. Lychnis, with intire petals, called the Single Catch-fly 4. Lychnis, with bifid petals and flowers growing in a corymbus. 5. Lychnis, with bifid petals, a stalk didivided by pairs, and leaves which are somewhat hairy. 6. Lychnis, with male and female flowers, on different plants, called Batchelor's Button. 7. Lychnis with a swoln cup, the petals of the flower shorter than the cup, and stalks with one flower.

The several species of this plant are perennial, and much cultivated in our gardens for the sake of their flowers; they are very hardy, and easily propagated, either by parting the roots, or by seeds. The roots should be parted in the latter end of August, or beginning of September, and planted in a light dry soil.

If raised from seed, the seed should be sown in March upon a bed of light fresh earth, and in May the young plants should be removed into another bed of the like earth, at about six inches distance from each other, and watered and shaded till they have taken root, after which they will require no further care than to be kept clear from weeds; and at the end of September following they may be removed, for the last time, into the borders where they are to stand, and they will flower in the June and July following; when, if suffered to ripen, their seeds will sow themselves, and come up without any further trouble.

Lychnis *Dwarf*: See Silene.

LYCIA, a country of Asia Minor, bounded by the Mediterranean on the south, Caria on the west, Pamphylia on the east, and Phrygia on the north. The country received the name of Lycia from Lycus, the son of Pandion, who established himself there. The inhabitants have been commended for their sobriety and justice. They were conquered by Crœsus, king of Lydia, and afterwards by Cyrus. Lycia became part of the Macedonian empire under Alexander, next was subject to the *Seleucidæ*, and finally reduced into a Roman province under the emperor Claudius.

LYCIDAS, a beautiful youth, the admiration of Rome in the age of Horace.

LYCIUM. Box-thorn. In botany a genus of the class pentandria, order monogynia. Corol tubular; filaments bearded, closing the throat of the corol; berry two-celled, many-seeded. Eleven species, chiefly natives of the Cape and other parts of Africa, a few of Europe and South America. The following are the chief:

1. Lycium, with linear leaves. 2. Lycium, with spear-shaped, thick leaves, and bifid cups. 3. Lycium, with wedge-shaped leaves.

These are shrubby plants. The first species is a native of Africa, and is propagated by seeds or cuttings. The seeds should be sown in autumn, soon after they are ripe; and if sown in pots, they should be plunged in some old tan in the winter, and in very severe frost covered with peas-haulm, or straw. In the spring the pots should be plunged into a moderate hot-bed, which will bring up the plants: as soon as the frosts are over, they should be inured to the open air: when three inches high, let them be shaken out of the pots, and each planted in a separate pot filled with loamy earth, and placed in the shade, till it has taken new root, after which it may be removed to a sheltered situation, where it may remain till autumn; then the plants should be either

removed into the green-house, or placed under a hot-bed frame, to shelter them from hard frost; when they have gathered strength, a few of them may be planted in the full ground, in a warm situation, where they will live in moderate winters, but in hard frosts they are commonly destroyed. If the cuttings of these plants be planted in a shady border, in July, and duly watered, they will take root; after which they may be treated like the seedling plants. The second species is a native of Asia and Africa. The third grows naturally in the south of Europe; both sorts may be propagated in the manner directed for the first species.

LYCIUS, an epithet given to Apollo from his temple in Lycia, where he gave oracles, particularly at Patara, where the appellation of *Lyciæ sortes* was given to his answers, and even to the will of the Fates.

LYCADONTES, in natural history, the petrified teeth of the *lupus piscis*, frequently found fossile.

LYCOMEDES, a king of Scyros, an island in the Ægean Sea, was secretly entrusted with the care of Achilles, whom Tethis had disguised in woman's clothes, to remove him from the Trojan war, where he must unavoidably perish. Lycomedes has rendered himself famous for his treachery to Theseus, who had implored his protection when driven from his throne of Athens by the usurper Mnestheus. Lycomedes, either envious of his fame, or bribed by Mnestheus, led Theseus to an elevated place, on pretence to shew him the extent of his dominions, and perfidiously threw him down a precipice, where he was killed.

LYCOPERDON, in botany, a genus of the class cryptogamia, order fungi. Fungus becoming powdery and fibrous within; seeds attached to the fibres. Twenty-nine species of which the greater number are natives of our own country. They must be thus subdivided:

A. Opening at the top and emitting the seeds; volvate or stipitate.

B. Opening at the top and emitting the seeds; stemless; terrestrial.

C. Opening at the top and emitting the seeds; stemless, perasitical.

Many botanists rank the *suber* or nuffle under this genus, but incorrectly; it has sufficient distinctions to form a separate genus, and will be found under the title *tuber*. The two following species are the chief or most worthy of notice:

1. L. Proteus. Puckfish. Roundish, white, or greyish becoming brown, opening with a rent; seeds dark. Common on our heaths.

2. L. Bovista. Puff-ball. Snowy, becoming black, spherical; outer coat downy, inner coriaceous; seeds black. More common on our heaths and dry pastures than the former. When young it is sometimes covered with tubercles on the outside, and is pulpy within. By age it becomes smooth externally, and dries internally into a very fine, light, brownish dust, which is used by the common people to stop hemorrhages.

LYCOPHRON, a famous Greek poet and grammarian, born at Colchis in Eubœa, flourished about 304 B. C. and, according to Ovid, was killed by an arrow. He wrote 20 tragedies; but all his works are lost, except a poem entitled *Cassandra*, which contains a long train of predictions, which he supposes to have been made by Cassandra, Priam's daughter. This poem is extremely obscure. The best edition of it is that of Dr. Potter, printed at Oxford in 1697, and 1702. Lycophron was one of the poets who formed the *Pleiades* under Ptolomy Philadelphus; i. e. the *seven* poets who were named from this constellation. They were *Theocritus*, *Aratus*, *Nicander*, *Apollonius*, *Philicus*, *Homer*, jun. and Lycophron.

LYCOP'ODIUM. Club-moss. In botany, a genus of the class cryptogamia, order filices. Capsules kidney-form, compressed, axillary, solitary, sessile, two-valved, naked, opening elastically; seeds numerous, very minute. Forty-four species, of which seven are common to our own country. Of these many have the fructification in the axil of the sessile leaves: but the greater part in the axils of the scales of the terminal spikes. The two following are the most common:

1. L. Selago. Uprigh club-moss. Leaves scattered, eight-rowed, somewhat imbricate, lance-subulate, a little concave; stem forked, erect, flat-lopped. It is known and employed in the pharmacopoeias under the name of *museus erectus*, which see.

2. L. Clavatus. Common club-moss. Leaves scattered, ending in a thread, spikes cylindric, peduncled, two or three together. This plant affords a great quantity of pollen, which is much esteemed in some countries to sprinkle on young children, to prevent frettings, or cure parts which are fretted. A decoction of the herb is said to be a specific in the cure of the plica polonica.

LYCOPOLIS, a town of Egypt. It received this name on account of the immense number of wolves, λυκοι, which repelled an army of Æthiopians, who had invaded Egypt.

LYCO'PSIS, in botany, a genus of the class pentandria, order monogynia. Corol with a curved tube; the throat closed with convex scales. Nine species, chiefly annuals of the Levant and Palestine: one common to our fields.

LY'COPUS, in botany, a genus, of the class diandria, order monogynia. Corol four-cleft, one of the segments notified; stamens distant; seeds four, naked, retuse. Three species: Italy, Virginia, and the river-banks of England.

LYCORIS, a freedwoman, called also Cytheris, celebrated for her beauty and intrigues. The poet Gallus was greatly enamoured of her, and his friend *Virgil* comforts him in his tenth eclogue for the loss

of the favours of Cytheris, who followed M. Antony's camp, and was become the Aspasia of Rome. The charms of Cleopatra, however, prevailed over those of Cytheris.

LYCORMAS, a river of Ætolia, whose sands were of a golden colour. It was afterwards called Evenus, from King Evenus, who threw himself into it.

LYCORTAS, the father of Polybius, who flourished B. C. 184. He was chosen general of the Achæan league, and he revenged the death of Philopœmen, &c.

LYCTUS, a town of Crete, the country of Idomeneus, whence he is often called *Lyctius*.

Lyctus, in entomology, a Fabrician tribe of the genus Tenebrio, which see.

LYCURGUS. Ancient writers have recorded many of this name; the most celebrated are the following: 1. A king of Thrace, son of Dryas, represented as impious, on account of the violence which he offered to Bacchus. He, according to the mythologists, drove Bacchus out of his kingdom, and abolished his worship, for which impiety the gods punished him. He put his son Dryas to death in a fury, and he cut off his own legs, mistaking them for vine boughs. He was put to death by his subjects, who had been informed by the oracle that they should not taste wine till Lycurgus was no more. This fable is explained by observing, that the aversion of Lycurgus for wine, over which Bacchus presided, arose from the disgrace of intoxication, and therefore the monarch wisely ordered all the vines of his dominions to be cut down, that his subjects might be preserved from the debauchery produced by too free an use of wine. 2. An orator of Athens, sirnamed Ibis, famous for his justice and impartiality when at the head of the government. He was one of the thirty orators whom the Athenians refused to give to Alexander. He died about 356 years before the Christian era. Those who wish to know more of this author may consult "Lycurge oratio contra Leocratum, cum not. va." a *Jo. Taylor*. Gr. et Lat. 8vo. Cantab. 1743. Annexed to the oration of Demosthenes *in Mediam*.

LYCURGUS, a celebrated lawgiver of Sparta, son of King Eunomus, and brother to Polydectes. He succeeded his brother on the throne; but when he saw that the widow of Polydectes was pregnant, he kept the kingdom only till Charilaus, his nephew, was arrived to years of maturity. The integrity with which he acted, raised him many enemies, and he at last retired to Crete. He visited Asia and Egypt without suffering himself to be corrupted by the luxury which prevailed there. He, at length, returned home, at the earnest solicitations of his countrymen. The disorder which reigned at Sparta, induced him to undertake a reform of the government. To give colour to his proceedings, he consulted the oracle of Delphi, where he was called the friend of the gods, and rather god than man. After such a reception from the oracle, Lycurgus found no difficulty in reforming the abuses of the state, and all were equally anxious in making a revolution which had received the sanction of heaven. This happened 884 years before the Christian era. Lycurgus first established a senate, which maintained a just equilibrium between the kings and the people. All distinction was destroyed, and an equal and impartial division of the land was made. Lycurgus banished luxury, and encouraged the useful arts. The use of money, either of gold or silver, was totally forbidden. All the citizens dined in common, and no one had greater claims to luxury than another. Their intercourse with other nations was forbidden, and few were permitted to travel. The youths were entrusted to the public master, as soon as they had attained their seventh year, and their education was left to the wisdom of the laws. They were taught early to think, to answer in a short and laconic manner, and to excel in sharp repartee. They were instructed and encouraged to carry things by surprise, but if ever the theft was discovered, they were subjected to a severe punishment. By his prudence and administration the face of Lacedæmon was totally changed. A set of men distinguished for their intrepidity and their magnanimity, immediately sprang up. After this Lycurgus retired from Sparta to Delphi, or Crete, and before his departure bound the citizens by a solemn oath, that neither they nor their posterity would alter the laws which he had established, before his return. He soon after put himself to death, and ordered his ashes to be thrown into the sea, lest if they were carried to Sparta, the citizens should call themselves freed from the oath which they had taken. Lycurgus has been compared to Solon, the celebrated legislator of Athens, and it has been judiciously observed that the former gave his citizens morals conformable to the laws which he had established, and that the latter had given the Athenians laws, which coincided with their customs and manners. The laws of Lycurgus were abrogated by Philopœmen B. C. 188, but only for a little time, as they were soon after re-established by the Romans. (*Plut. Justin. Strab.* &c.)

LYCUS, a king of Bœotia, successor to his brother Nycteus, was entrusted with the government only during the minority of his nephew Labdacus. He was enjoined to make war against Epopeus, who had carried away Antiope, the daughter of Nycteus. He was successful in this expedition, Eupopeus was killed, and Lycus recovered Antiope and married her, though his niece. This displeased his first wife Dirce, and Antiope was delivered to the queen and tortured in the most cruel manner. Antiope at last escaped,

and entreated her sons Zethus and Amphion, (*vid.*) to avenge her wrongs. The children incensed, on account of the cruelties which their mother had suffered, besieged Thebes, killed Lycus, and tied Dirce to the tail of a wild bull, who dragged her till she died. 2. A king of Libya, who sacrificed whatever strangers came upon his coast. When Diomedes, at his return from the Trojan war, had been shipwrecked there, the tyrant seized him and confined him. He, however, escaped by means of Callirhoe, the tyrant's daughter, who was enamoured of him, and who hung herself when she saw herself deserted. This name was also common to six rivers in different parts of Asia.

Lycus, in entimology, a palnean tribe, of the genus lampyris, which see.

LYDD, a town in Kent, with a market on Thursday. It is a member of the cinque port of Romney, and seated in Romney Marsh, 26 miles south of Canterbury, and 71 south-east of London. Lon. 1. 4. E. Lat. 50. 58. N.

LYDGATE (John), called the *Monk of Bury;* not, as Cibber conjectures, because he was a native of that place, for he was born about the year 1380, in the village of Lydgate; but because he was a monk of the Benedictine convent at St. Edmund's-Bury. After studying some time in our English universities, he travelled to France and Italy; and, having acquired a competent knowledge of the languages of those countries, he returned to London, where he opened a school, in which he instructed the sons of the nobility in polite literature. At what time he retired to the convent of St. Edmund's-Bury, does not appear; but he was certainly there in 1415. He was living in 1446, aged about 66; but in what year he died is not known. Lydgate, according to Pits, was an elegant poet, a persuasive rhetorician, an expert mathematician, an acute philosopher, and a tolerable divine. He was a voluminous writer; and, considering the age in which he lived, an excellent poet. His language is less obsolete, and his versification much more harmonious, than the language and versification of Chaucer, who wrote about half a century before him. He wrote, 1. History of the Theban War, printed at the end of Chaucer's works, 1561, 1602, 1687. 2. Poemation of Good Counsel; at the end of Chaucer's works. 3. The Life of Hector; London, 1594, fol. printed by Gross, dedicated to Henry V. 4. Life of the Blessed Virgin: printed by Caxton. 5. The Proverbs of Lydgate upon the Fall of Princes; printed by Wink. Word. Lond. . . .. 4to. 6. Dispute of the Horse, the Sheep, and the Goose; printed in Caxton's Collect. 4to. 7. The Temple of Brass; among the works of Chaucer. 8. London Lickpenny; *vide* Stowe's History, &c. Besides an incredible number of other poems and translations preserved in various libraries, and of which the reader will find a catalogue in Bishop Tanner.

LYDIA (anc. geog.), a celebrated kingdom of Asia Minor. All the ancient writers tell us, that Lydia was first called *Mæonia*, or *Meonia*, from Meon, king of Phrygia and Lydia; and that it was known under no other denomination till the reign of Atys, when it began to be called *Lydia*, from his son Lydus. Bochart finding in his learned collection of Phœnician words, the verb *luz*, signifying "to wind," and observing that the country we are speaking of is watered by the Mæander, so famous for its windings, concludes that it was thence named *Lydia*, or *Ludia*. As to the ancient name of Mæonia, he takes it to be a Greek translation of the Phœnician word *lud*; wherein he agrees in some measure with Stephanus, who derives the name of Mæonia from Mæon the ancient name of the Mæander. Some take the word *Mæonia* to be a translation of a Hebrew word signifying "metal," because that country, say they, was in former times enriched above any other with mines. Though Lydia and Mæonia are by most authors indifferently used for one and the same country, yet they are sometimes distinguished; that part where Mount Tmolus stood, watered by the Pactolus, being properly called *Mæonia*; and the other, lying on the coast, *Lydia*. This distinction is used by Homer, Callimachus, Dionysius, and other ancient writers. In after ages, when the Ionians, who had planted a colony on the coast of the Egean Sea, began to make some figure, that part was called *Ionia*, and the name of *Lydia* given to the ancient Mæonia. Lydia, according to Pliny, Ptolemy, and other ancient geographers, was bounded by the Mysia Major on the north, by Caria on the south, by Phrygia Major on the east, and Ionia on the west, lying between the 37th and 39th degrees of north latitude. What the ancients style the kingdom of *Lydia*, was not confined within these narrow boundaries, but extended from Halys to the Egean Sea. Pliny's description includes Æolia, lying between the Hermus and the Caicus. It was governed by monarchs who after the fabulous ages reigned for 249 years, down to Crœsus, who was conquered by Cyrus, B. C. when the kingdom became a province of the Persian empire.

LYDIAN, in ancient music, the name given by the Greeks to that of their modes which was placed between the *Æolian* and the Hyperdorian. From its bearing the name of an Asiatic people, it was sometimes called the *barbarous* mode. The character of the *Lydian* mode is said to have been striking and animated, yet highly capable of pathos and softness. It was for the latter quality that Plato banished it from his republic. This is the mode by which Orpheus is poetically said to have attracted the very

beasts, and Amphion to have built the walls of Thebes. Some impute its invention to Amphion, the son of Jupiter and Antiope, others to Olympus the disciple of Marsyas, and others again to Melampides. Pindar informs us, that it was first used at the marriage of Niobe. *Lydian* was also the name of an instrument used by the Greeks, which is supposed to have been so called from their being indebted for it to their Asiatic neighbours.

LYDIAT (Thomas), a learned English divine, born in 1572, and educated at Oxford. About the year 1609, he became acquainted with Dr. Jomes Usher, afterwards archbishop of Armagh, who carried him to Ireland. He was at Dublin college for about two years, after which he returned to England; and the rectory of Alkrington becoming vacant, he was presented to it: but at length, being engaged for the debts of a near relation, which for the present he was unable to pay, having before spent his patrimony in printing several books, he was sent to prison, and was confined at Oxford, in the King's-bench, and elsewhere, till Sir William Boswell, a generous patron of learned men, Dr. Robert Pink, warden of New-college, Bishop Usher, and Dr. Laud, discharged the debt. In the civil wars he suffered much in his rectory of Alkrington from the parliament-party; was four times pillaged to the value of at least 70 l. and was forced for a quarter of a year together to borrow a shirt to shift himself. He died in 1646. He wrote some pieces in English, and many works in Latin, on chronology and natural history.

LYDIUS, in mineralogy, a genus of the class earths, order siliceous. Consisting of silex, a small quantity of lime, magnesia, oxyd of iron, and inflammable matter; hard, lightish, opake, compact, cinereous, black or greenish black, slaty, of a common form, breaking into indeterminate fragments, detached, or constituting mountains. Two species.

1. L. Siliceus. Siliceous schistus. Keiselscheifer. Wern. Subopake, of a splintery fracture, without internal lustre. Found in various parts of Europe in blocks of amorphus masses of various sizes, and very often in the beds of rivers; colour blackish-grey, or greenish, often intersected with veins of grey quartz, or blood-red iron-stone.

2. L. Germinus. Basanite. Lydian stone. Touchstone. Of an even texture, sometimes approaching to a conchoid, shining a little internally. Found in the river Tmolus, in Lydia, and in various parts of Europe detached or in masses, and commonly intersected by veins of quartz: colour dark greyish-black; its powder black; specific gravity 2,596. It is used as a touchstone to judge of the purity of metals.

LYGÆ'US, in entomology, a fabrician tribe of the hemipterous genus limex, which see.

LY'GEUM. Moss-weed. In botany a genus of the class triandria; order monogynia. Spathe one-leafed; corols two on the same germ; nut two-celled. One species: a grass of Spain, employed in making baskets and mattrasses.

LYGO'DIUM. In botany, a genus of the class cryptogamia; order filices. Fructification solitary, sessile, within the imbricate, two-rowed scales, of the marginal spikes of the segments of the frond, one-celled, two-valved; seeds numerous, roundish. Four species—all exotics. One of them the *ophiogloss* of Thunberg.

LYGU'STRUM. Privet. In botany, a genus of the class diandria monogynia. Corol four-cleft, berry superior, two-celled, four-seeded. Two species; one a native of Japan; one common to the hedges and thickets of our own country.

LYING-IN WOMEN. See MIDWIFERY.

LYING *under the Sea*, in sea language, is when, in a storm, the ship is a-hull, and the helm so fastened a-lee, that the sea breaks upon her bow, or broadside.

LYING *along* denotes the state of a ship, when pressed down sideways by a weight of sail in a fresh wind that crosses the ship's course either directly or obliquely.

LYING-*to*, or *lyiug-by*, denotes the situation of a ship when she is retarded in her course, by arranging the sails in such a manner as to counteract each other with nearly an equal effort, and render the ship almost immoveable, with respect to her progressive motion, or head-way. A ship is usually brought-to by the main or fore-top-sails, one of which is laid a-back, whilst the other is full; so that the latter pushes the ship forward, whilst the former resists this impulse, by forcing her a-stern. This is particularly practised in a general engagement, when the hostile fleets are drawn up in two lines of battle opposite to each other; it is also used to wait for some other ship, either approaching or expected; or to avoid pursuing a dangerous course, especially in dark or foggy weather.

LYME-GRASS, in botany. See ELYMUS.

LYME, a river of England, which for some distance divides the county of Dorset from Devonshire, and runs into the sea, near the town of Lyme.

LYME REGIS, a borough and seaport of Dorsetshire, with a market on Friday. It is seated on the declivity of a craggy hill, on the river Lyme, at the head of a little inlet; and its harbour is formed by a noble pier, called the Cobb. It has a Newfoundland and coasting trade, and is noted for sea-bathing. Here the Duke of Monmouth landed, in 1685, for the execution of his ill-judged design against James II. Lyme is governed by a mayor, and sends two members to parliament. It is 28 miles east by south of Exeter, and 143 west by south of London. Lon. 3. 0. W. Lat. 53. 40. N.

LYMEXYLON. In entomology, a fabri-

cian tribe of the coleopterous genus Cantharis; which see.

LYMINGTTON, a seaport town of England, in the county of Hants, with a harbour for vessels of considerable burden. It is a corporation town, and sends two members to the British parliament. The town is situated about a mile from the channel which runs between the mainland of England and the Isle of Wight; the tide flows about a mile beyond the town. The chief trade is making salt, which is sent to all the south parts of England, by land and water. It has a weekly market on Satu day: 17 miles south-west of Southampton, and 97 south-west of London. Lon. 1. 33. W. of Greenwich. Lat. 50. 43. N.

LYMPH. (*Lympha*, νυμφη the ν exchanged for an λ.) Generally used to express a clear liquid, transparent and colourless water; found abundantly, but with several modifications, in various parts of the animal body. It is particularly distinguished into *watery* and *coagulable* lymph. The former (of which the tears are an example) is little more than water, holding in solution a very minute portion of salt, and still less of animal matter. The latter, which is often found in great quantity and perfection in incysted dropsy, contains, independently of the substances already mentioned, a considerable portion of albumen, so as to be viscid to the touch, and when heated, to coagulate firmly like the white of the egg. See the article ALBUMEN.

LYMPHATE, was a name given by the Romans to such as were seized with madness.

LYMPHA'TIC GLANDS. (*Glandulæ lymphaticæ.*) See CONGLOBATE GLANDS.

LYMPHATICS, in anatomy, absorbents that carry a transparent fluid or lymph. They are small transparent vessels, which originate in every part of the body. With the lacteal vessels of the intestines they form what is termed the *absorbent system*. Their termination is in the thoracic duct. See ANATOMY.

*Lymphatics of the head and neck.*—Absorbents are found on the scalp and about the viscera of the neck, which unite into a considerable branch that accompanies the jugular vein. Absorbents have not been detected in the human brain: yet there can be no doubt of their being such vessels: it is probable that they pass out of the cranium through the canalis caroticus and foramen lacerum in basi cranii, on each side, and join the above jugular branch, which passes through some glands as it proceeds into the chest to the angle of the subclavian and jugular veins.

*Lymphatics of the upper extremities.*—The absorbents of the upper extremities are divided into superficial and deep-seated. The superficial absorbents ascend under the skin in every direction to the wrist; whence a branch proceeds upon the posterior surface of the fore-arm to the head of the radius, over the internal condyle of the humerus, up to the axilla, receiving several branches in its progress. Another branch proceeds from the wrist along the anterior part of the fore-arm, and forms a net-work with a branch coming over the ulna from the posterior part, and ascends on the inside of the humerus to the glands of the axilla. The deep-seated absorbents accompany the larger blood-vessels, and pass through two glands about the middle of the humerus, and ascends to the glands of the axilla. The superficial and deep seated absorbents having passed through the axillary glands, form two trunks, which unite into one, to be inserted with the jugular absorbents into the thoracic duct, at the angle formed by the union of the subclavian with the jugular vein.

*Lymphatics of the inferior extremities.*—These are also superficial and deep-seated. The superficial ones lie between the skin and muscles. Those of the toes and foot form a branch which ascends upon the back of the foot over the tendon of the cruræus anticus, runs with other branches a plexus above the ancles, then proceeds along the tibia over the knee, sometimes passes through a gland, and advances on the inside of the thigh to the subinguinal glands. The deep-seated absorbents follow the course of the arteries, and accompany the femoral artery, in which course they pass through some glands in the leg and above the knee, and then proceed to some deep-seated subinguinal glands. The absorbents from about the external parts of the pubis, as the penis, perineum, and from the external parts of the pelvis, in general proceed to the inguinal glands. The subinguinal and inguinal glands send forth several branches, which pass through the abdominal ring into the cavity of the abdomen.

*Lymphatics of the abdominal and thoracic viscera.* The absorbents of the lower extremities accompany the external iliac artery, where they are joined by many branches from the uterus, urinary bladder, spermatic chord, and some branches accompanying the internal iliac artery: they then ascend to the sacrum, where they form a plexus, which proceeds over the psoas muscles, and meeting with the lacteals of the mesentery form the thoracic duct, or trunk of the absorbents, which is of a serpentine shape, about the size of a crow-quill, and runs up the dorsal vertebræ, through the posterior opening of the diaphragm, between the aorta and vena azygos, to the angle formed by the union of the subclavian and jugular veins. In this course it receives the absorbents of the kidneys, which are superficial and deep-seated, and unite as they proceed towards the thoracic duct: the absorbents of the spleen, which are upon its peritoneal coat, and unite with those of the pancreas: a branch from a plexus of vessels

passing above and below the duodenum, and formed by the absorbents of the stomach, which come from the less and greater curvature, and are united about the pylorus with those of the pancreas and liver, which converge from the external surface and internal parts towards the portæ of the liver, and also by several branches from the gall-bladder.

*Use of Lymphatics.*—The office of these vessels is to take up substances which are applied to their mouths; thus the vapour of circumscribed cavities, and of the cells of the cellular membrane are removed by the lymphatics of those parts; thus mercury and other substances are taken into the system when rubbed on the skin: and thus when a part of an organ is so much injured from any cause as to be incapable of performing its accustomed functions, and retaining its living principle, every portion of such organ in consequence of an instinctive increase of action on the part of the surrounding lymphatics, whether cellular substance, nerve, artery, muscle, tendon, ligament, or even bone itself, is absorbed and carried away, in order to introduce by a correspondent increase of action on the part of the surrounding secrements such a deposit or generation of new and healthy and appropriated animal matter, as may supply the place of that which has been removed, and enable the organ to reassume its accustomed and perfect habit. The principle of action is supposed to be an inherent power in the mouths of the absorbent vessels; or rather perhaps is dependent on a modification of that instinctive principle which is common in some form or other to matter of every kind; but is seen under different arrangements, and possessed of different powers, in the different classifications of organized substances, whether minerals, vegetables, or animals. Hence the use of this function appears to be of the utmost importance, viz. to supply the blood with chyle; to remove the superfluous vapour of circumscribed cavities, otherwise dropsies, as hydrocephalus, hydrothorax, hydrocordis, ascites, hydrocele, &c. would constantly be taking place: to remove the superfluous vapour from the cells of the cellular membrane dispersed throughout every part of the body, that anasarca may not take place: to remove the hard and soft parts of the body, and to convey into the system medicines which are applied to the surface of the body.

LY'MPHEDUCTS. See LYMPHATICS.

LY'NCEUS, in fabulous history, one of the fifty sons of Ægeus, married Hypermnestra, one of the fifty daughters of Danaus. See HYPERMNESTRA.

LY'NCEUS, in fabulous history, one of the Argonauts who went with Jason in the expedition to obtain the golden fleece. He was of great use to the Argonauts, by enabling them to avoid the sand-banks and rocks they found in their way. The poets say, that Lynceus had so piercing a sight, that it could not only penetrate to the bottom of the sea, but even to hell. Some mythologists suppose, that this fable is taken from Lynceus's skill in observing the stars, and discovering the mines of gold and silver concealed in the earth.

LY'NCURIUM, a stone thought to be the same with the tourmalin. The name is derived from λυγξ, "lynx;" and ϐρον, "urine."

LYNCUS, LYNCÆUS, or LYNX, a cruel king of Scythia, or of Sicily. He received, with feigned hospitality, but resolved to murder in his sleep Triptolemus, whom Ceres had sent to teach mankind agriculture. As he was going to give the deadly blow, he was suddenly changed into a lynx, an animal the emblem of perfidy and of ingratitude.

LYNDHURST, a village in Hants, with a seat which belongs to the Duke of Gloucester, as lord warden of the New forest. It is seven miles north of Lymington.

LYNN, or LYNN *Regis*, or *King's* LYNN, a town of England, in the county of Norfolk, situated about ten miles from the German Sea, ou the eastern bank of the river Ouse, which forms a good harbour, and is divided by four small rivers, over which there are fifteen bridges, and at the north end of the town is a platform of twelve cannon, called St. Ann's Fort. King John made it a free borough for its fidelity, during his wars with the barons, and Henry III. granted it a mayor for the same reason. It is governed by a mayor, aldermen, high steward, recorder, &c. and sends two members to the British parliament. The harbour is capable of containing 300 merchants' ships, and sometimes a strong wind will drive the ships from their moorings. The situation of this town, near the fall of the Ouse into the sea, gives it an opportunity of extending its trade into eight different counties; so that it supplies many considerable cities and towns with heavy goods, not only of our own produce, but such as are imported from abroad. Its trade in wine and coals is such, that from 90,000 to 100,000 chaldrons of coals are brought annually into this port: and the annual importation of wine is more than 2000 pipes. It appeared by the report made by the commissioners for auditing the public accounts in the year 1784, that the annual duties amounted to more than those at any other port in the kingdom, except London, Bristol, Liverpool, and Hull. The trade of this town in corn is extremely large; and in iron, deals, timber, and other kinds of merchandize, is also considerable. Its foreign trade is very considerable, especially to Holland, Norway, the Baltic, Spain, and Portugal, and formerly they drove a good trade to France, till it was turned off by treaties on one hand, and by prohibitions, high duties, &c. on the other, to Spain and Portugal. In the year 1643 the

parliamentary forces besieged the town; the siege began on the 28th of August, and continued till the 16th of September, when it was surrendered; and to preserve it from plunder, was obliged to pay to every foot soldier of the besieging army, under the command of the Earl of Manchester, ten shillings; and to every foot officer, under the rank of captain, a fortnight's pay; amounting in all to the sum of 3200l. after which it was made a garrison town for the parliament. Preparatory to the restoration of Charles II. it was fortified afresh by Sir Horatio Townshend. Two markets are held weekly, on Tuesday and Saturday. In 1800 the number of houses in Lynn was 2012; of inhabitants 10,096. It is 42 miles west-north-west of Norwich, and 106 north by east of London. Lon. 0. 24. E. Lat. 52. 48. N.

A history of the port and corporation of Lynn is now publishing in monthly numbers, by the Rev. Mr. Richards.

LY'NX, in mastiology. See Felis.

Ly'nx, in mythology, was a fabulous animal consecrated to Bacchus.

Ly'nx, in astronomy, is a constellation of the northern hemisphere, made by Hevelius out of unformed stars: the number of stars in Hevelius's catalogue is nineteen, and in the Britannic is forty-four, viz.

0·0.0·3·12·.0·8.

LYON King of Arms. See King. This office is of great antiquity and respect in Scotland; and although the precise time of its institution is unknown, yet it must have been as early as the introduction of armorial figures, as hereditary marks of gentility and distinction into this country, which was in the twelth century. His regalia are, a crown of gold, with a crimson velvet cap, a gold tassel, and an ermine lining; a velvet robe reaching to his feet, with the arms of the kingdom embroidered thereon before and behind in the proper tinctures; a triple row of gold chain round his neck, with an oval gold medal pendent thereto, on one side of which is the royal bearing, and on the other St. Andrew with his cross enamelled in proper colours, and a baton of gold enamelled green, powdered with the badges of the kingdom. The lord lyon's rank is superior to that of any other king of arms, as he holds his office immediately from the sovereign by commission under the great seal; whereas the kings of arms in England are deputies to the earl marshal, and act under his authority. Formerly Scotland was divided into two provinces, the one on the north and the other on the south side of Forth; and these provinces were under the management of two deputies appointed by the lord lyon, to superintend the execution of all the business of his office. Before the revolution, the lord lyon, at his admission into office, was most solemnly crowned by the sovereign or his commissioner, in presence of the nobility, the officers of state, and other great men, after a suitable sermon preached at the royal chapel; and his crown was of the same form with the imperial crown of the kingdom. On solemn occasions he wears the regalia above described; at all other times, he wears the oval gold medal or badge on his breast, suspended by a broad green ribbon. He has the absolute disposal of all the offices in his own court, and of the heralds' and pursuivants' places. The messengers at arms throughout Scotland are also created by him, and are amenable to his jurisdiction. And the powers vested in him by his commission are the same with those of the sovereign in all matters relative to the marks of gentility.

LYONOIS, a late province of France, which, with that of Forez, forms the department of Rhone and Loire.

LYONS, the second city of France for beauty, commerce, and opulence. It is the capital of the department of Rhone and Loire, and is seated at the confluence of the Rhone and Saone. It was founded about the year 42 B. C. by the Romans, who made it the centre of the commerce of the Gauls. About the year 145 it was totally destroyed by fire, but was rebuilt by the munificence of Nero. Many antiquities are still observed, that evince its Roman origin. Lyons is the see of an archbishop, and before its recent calamities, contained 100,000 inhabitants, upwards of 30,000 of whom were employed in various manufactures, particularly of rich stuffs, of the most exquisite workmanship, in silk, gold, silver, &c. The quays were adorned with magnificent structures. The Hotel-de-Ville vied with that of Amsterdam; and the theatre was not surpassed by any in France. The other principal public buildings were the Hotel-Dieu, the Hospital of Charity, the Exchange, the Custom-house, the Palace of Justice, the Arsenal, a public library, and two colleges. The bridge, which unites the city with the suburb de la Guillotiere, is 1560 feet long; and there are three other principal suburbs, six gates, and several fine churches. Such was Lyons before the fatal year 1793, when, in June, it revolted against the National Convention. Being obliged to surrender, in October, the convention decreed, that the walls and public buildings of Lyons should be destroyed, and the name of the city changed to that of Ville Affranchie. The chief of the insurgents had fled, but several of them were afterwards taken; and of 3528 persons that were tried before the revolutionary tribunal, 1682 were either shot or beheaded. In 1794, however, on the destruction of the faction of the Jacobins, the convention decreed, that the city should resume its ancient name, and that measures should be taken to restore its manufactures and commerce; and, in 1795, the friends of those who were so wantonly put to death in 1793, avenged their fate by a general massacre of the judges of the re-

volutionary tribunal, and of all the Jacobins who were then confined in the prisons of Lyons. This city is 15 miles north of Vienne, and 220 south-east of Paris. Lon. 4. 55. E. Lat. 45. 46. N.

Lyons (Israel), a good mathematician and botanist, was the son of a Polish Jew, silversmith, and teacher of Hebrew at Cambridge in England, where he was come to settle, and where young Lyons was born, 1739. He was a very extraordinory young man for parts and ingenuity; and shewed very early in life a great inclination to learning, particularly in mathematics, on which account he was much patronized by Dr. Smith, master of Trinity College. About 1755 he began to study botany, which he continued occasionally till his death; in which he made a considerable progress, and could remember not only the Linnéan names of almost all the English plants, but even the synonyma of the old botanists; and he had prepared large materials for a Flora Cantabrigiensis, describing fully every part of each plant from the specimen, without being obliged to consult, or being liable to be misled, by former authors.

In 1758 he obtained much celebrity, by publishing a Treatise on Fluxions, dedicated to his patron Dr. Smith; and in 1763, Fasciculus Plantarum circa Cantabrigiam, &c. In the same year, or the year before, he read lectures on botany at Oxford with great applause, to at least sixty pupils; but he could not be prevailed on to make a long absence from Cambridge.

Mr. Lyons was some time employed as one of the computers of the nautical almanack; and besides he received frequent other presents from the Board of Longitude for his own inventions. He had studied the English history, and could quote whole passages from the monkish writers verbatim. He could read Latin and French with ease, but wrote the former ill. He was appointed by the Board of Longitude to sail with Captain Phipps, in his voyage towards the North Pole, in 1773, as astronomical observator; and he discharged that office to the satisfaction of his employers. After his return from this voyage, he married and settled in London, where he died of the measles in about two years.

At the time of his death he was engaged in preparing for the press a complete edition of all the works of the late learned Dr. Halley, a work very much wanted. His calculations in "Spherical Trigonometry abridged," were printed in the Philo. Trans. vol. lxv. for the year 1775, page 470. After his death, his name appeared in the title-page of a geographical dictionary. the astronomical parts of which were said to be "taken from the papers of the late Mr. Israel Lyons, of Cambridge, author of several valuable mathematical productions, and astronomer to Lord Mulgrave's voyage to the northern hemisphere." The astronomical and other mathematical calculations, printed in the account of Captain Phipps's voyage towards the north pole, mentioned above, were made by Mr. Lyons. This appeared afterwards, by the acknowledgement of Captain Phipps afterwards Lord Mulgrave), when Dr. Horsley detected a material error, in some part of them, in his "Remarks on the Observations made in the late Voyage, &c." 1774.

"The Scholar's Instructor, or Hebrew Grammar, by Israel Lyons, teacher of the Hebrew tongue in the University of Cambridge," the second edit, &c. 1757, 8vo.; was the production of his father, as was also another treatise, printed at the Cambridge press, under the title of "Observations and Inquiries relating to various parts of Scripture History," 1761.

LYRA, (*Lyra, æ.* f. from λυρα, a lyre, or musical instrument.) *Psalterium.* In anatomy, the triangular medullary space between the posterior crura of the fornix of the cerebrum, which is marked with prominent medullary fibres that give the appearance of a lyre.

Lyra *Doppia*, or *Double Lyre.* (Italian.) The name of an instrument not at present known, but supposed by some to have been a kind of Viol da Gamba.

Lyra *Mendicorum.* (Latin.) The name of an ancient instrument, the body of which was formed something like that of a violin. It had four strings, which were distended from the neck to the lower part, and agitated in performance by the friction of a wheel.

Lyra-*Viol.* An instrument once much in use, so named because it was tuned in a manner formerly called the harp-way. It was in form something like the common viol, and had six strings, and seven frets or stops, to which were assigned seven letters of the alphabet, viz. B, C, D, E, F. G, H. the letter A answering to the open string wherever it occurs.

Lyra, in astronomy, a constellation in the northern hemisphere. The number of its stars, in Ptolemy's catalogue, is ten; in Tycho's eleven; in Hevelius's seventeen; and in the Britannic catalogue twenty-one, viz. 1·0·3·2·5·10.

LY'RATE. In botany, applied to the leaf, a lyre-shaped leaf. *Transversim divisum in lacinias, quarum inferiores minores remotiores.*—Divided transversely into several jags, the lower ones smaller and more remote from each other than the upper ones.

LYRE, one of the most ancient of the stringed species of instruments, and said to have been invented by Mercury, in the year of the world 2000. Its frame first consisted of the shell of a fish; but concerning the original number of its strings, there is a variety of opinions: some assert it to have been only three, and that Mercury resembled them to as many seasons of the year, which were all that the Greeks reckoned,

viz. summer, winter, and spring; assigning the acute string to the first, the grave to the second, and the mean to the third. Some again say that it had four strings, and others that it had seven. But authors generally agree in giving Mercury the honour of its invention, and say that the knowledge of the instrument, as formed by him, was transmitted by Orpheus, who taught the use of it to Thamyris and Linus, the latter of whom communicated the art to Hercules. From Hercules it passed to Amphion, the celebrated Theban Lyrist, and afterwards to the Grecian, Terpander, who carried it to Egypt greatly improved, and exhibited it to the Egyptian priests as his own invention.

The different claimants among the Greeks to the same musical discoveries, only prove, that music was cultivated in different countries; and that the inhabitants of each country invented and improved their own instruments, some of which happening to resemble those of other parts of Greece, rendered it difficult for historians to avoid attributing the same invention to different persons. Thus the single flute was given to Minerva and to Marsyas; the syrinx or fistula, to Pan and to Cybele; and the lyre or cithara, to Mercury, Apollo, Amphion, Linus, and Orpheus. Indeed, the mere addition of a string or two to an instrument without a neck, was so obvious and easy, that it is scarce possible not to conceive many people to have done it at the same time.

With respect to the form of the ancient lyre, as little agreement is to be found among authors as about the number of strings. The best evidences concerning it are the representations of that instrument in the hands of ancient statues, bas-reliefs, &c. See plate 100, where fig. 3. is a representation of the testudo, or lyre of Amphion, in front, as it appears on the base of the celebrated Toro Farnese at Rome. This admirable work, consisting of four figures bigger than the life, besides the toro, or bull, was found in Caracalla's baths, where the Farnese Hercules was likewise discovered: and, except the Laocoon, is the only piece of Greek sculpture mentioned by Pliny that is now remaining. The two projections near the bottom seem to have been fastenings for the strings, and to have answered the purpose of tail-pieces in modern instruments. 4. The lyre held by Terpsichore, in the picture of that muse dug out of Herculaneum. 5. The Abyssinian testudo, or lyre in use at present in the province of Tigre, from a drawing of Mr. Bruce, communicated to Dr. Burney. "This instrument," says he, "has sometimes five, sometimes six, but most frequently seven strings, made of the thongs of raw sheep or goat skins, cut extremely fine, and twisted; they rot soon, are very subject to break in dry weather, and have scarce any sound in wet. From the idea, however, of this instrument being to accompany and sustain a voice, one would think that it was better mounted formerly. The Abyssinians have a tradition, that the sistrum, lyre, and tambourine, were brought from Egypt into Ethiopia, by Thot, in the very first ages of the world. The flute, kettle-drum, and trumpet, they say, were brought from Palestine, with Menelek, the son of their queen of Saba by Solomon, who was their first Jewish king.

"The lyre in Amharic is called *beg*, "the sheep;" in Ethiopic, it is called *mesinko;* the verb *sinko* signifies to strike strings with the fingers: no plectrum is ever used in Abyssinia; so that mesinko, being literally interpreted, will signify the 'stringed instrument played upon with the fingers.'

"The sides which constitute the frame of the lyre were anciently composed of the horns of an animal of the goat kind called agazan, about the size of a small cow, and common in the province of Tigre. I have seen several of these instruments very elegantly made of such horns, which nature seems to have shaped on purpose. Some of the horns of an African species of this animal may be seen in M. Buffon's history of the king of France's cabinet. They are bent, and less regular than the Abyssinian: but after fire-arms became common in the province of Tigre, and the woods were cut down, this animal being more scarce, the lyre has been made of a light red wood: however, it is always cut into a spiral twisted form, in imitation of the ancient materials of which the lyre was composed. The drawing I send you was one of these instruments made of wood.

"The kingdom of Tigre, which is the largest and most populous province of Abyssinia, and was during many ages the seat of the court, was the first which received letters and civil and religiou government; it extended once to the Red Sea: various reasons and revolutions have obliged the inhabitants to resign their sea-coast to different barbarous nations, Pagan and Mahometan: while they were in possession of it, they say that the Red Sea furnished them with tortoise-shells, of which they made the bellies of their lyres, as the Egyptians did formerly, according to Apollodorus and Lucian; but having now lost that resource, they have adopted, in its place, a particular species of gourd, or pumpkin, very hard and thin in the bark, still imitating with the knife the squares, compartments, and figure of the shell of the tortoise.

"The lyre is generally from three feet to three feet six inches high; that is, from a line drawn through the point of the horns, to the lower part of the base of the sounding-board. It is exceedingly light and easy of carriage, as an instrument should naturally be in so rugged and mountainous a country.

"When we consider the parts which compose this lyre, we cannot deny it the earliest antiquity. Man in his first state was a hunter

and a fisher, and the oldest instrument was that which partakes most of that state. The lyre, composed of two principal pieces, owes the one to the horns of an animal, the other to the shell of a fish.

"It is probable that the lyre continued with the Ethiopians in this rude state as long as they confined themselves to their rainy, steep, and rugged mountains; and afterwards, when many of them descended along the Nile in Egypt, its portability would recommend it in the extreme heats and weariness of their way. Upon their arrival in Egypt, they took up their habitation in caves, in the sides of mountains, which are inhabited to this day. Even in these circumstances, an instrument larger than the lyre must have been inconvenient and liable to accidents in those caverns; but when these people increased in numbers and courage, they ventured down into the plain, and built Thebes. Being now at their ease, and in a fine climate, all nature smiling around them, music and other arts were cultivated and refined, and the imperfect lyre was extended into an instrument of double its compass and volume. The size of the harp could be now no longer an objection; the Nile carried the inhabitants every where easily, and without effort; and we may naturally suppose, in the fine evenings of that country, that the Nile was the fovourite scene upon which this instrument was practised; at least the sphinx and lotus upon its head seem to hint that it was someway connected with the overflowings of that river." See Harp and Dichord.

LYRIC Poetry, was such as the ancients sung to the lyre, or harp. It was originally employed in celebrating the praises of gods and heroes, and its characteristic was sweetness. Who was the author of it is not known. It was much cultivated by the Greeks; and Horace was the first who attempted in the Latin language. Anacreon, Alcæus, Stesichorus, Sappho, and Horace, were the most celebrated lyric poets of antiquity.

LYRIST. A performer on the lyre. In ancient Greece the Lesbian lyrists were the most celebrated.

LYR'ODI, among the ancients, a kind of musicians who played on the lyre and sung at the same time. This appellation was also given to such as made it their employment to sing lyric poems composed by others.

LYSANDER, a name common to three Spartans, the most celebrated of whom is the general in the last years of the Peloponnesian war. He gave battle to the Athenian fleet, consisting of 120 ships, at Ægospotamis, and destroyed it all, except three ships. In this celebrated battle, which happened 405 years B.C. the Athenians lost 3000 men, and with them their empire and influence among the neighbouring states. The government of Athens was then totally changed, and thirty tyrants were set over it by Lysander, whose pride this glorious success encreased. He had already begun to pave his way to universal power, and now he attempted to make the crown of Sparta elective. To effect this, he attempted to corrupt the oracles of Delphi, Dodona, and Jupiter Ammon, but was even accused of using bribes by the priests of the Libyan temple. He was saved from this accusation by the sudden declaration of war against the Thebans, against whom, together with Pausanias, he was sent. The plan of his military operations was discovered, and the Haliartians, whose ruin he secretly meditated, attacked him unexpectedly, and he was killed in a bloody battle, which ended in the defeat of his troops, B.C. 394. His body was recovered by his colleague Pausanias, and honoured with a magnificent funeral. Lysander has been commended for his bravery; but his ambition, his cruelty, and his duplicity, have greatly stained his character. *Plut. C. Nep.*

LYSANDRA, a daughter of Ptolemy Lagus, who married Agathocles, the son of Lysimachus. She was persecuted by Arsinoe, and fled to Seleucus for protection. *Paus.*

LYSIAS, an ancient Grecian orator, was born at Syracuse in the 80th olympiad. At 15, he went to Thurion, a colony of the Athenians, and, when grown up, assisted in the administration of the government there many years. When about 47 years of age he returned to Athens; whence, being afterwards banished by the thirty tyrants, he went to Megara. Upon his return, Thrasybulus would have had him employed again in state matters; but this not taking place, he spent the remainder of his life as a private man. He was very familiar with Socrates and other illustrious philosophers. He professed to teach the art of speaking; not that he pleaded at the bar himself, but he supplied others with speeches. "Fuit Lysias in causis forensibus non versatus (says Cicero), sed egregie subtilis scriptor atque elegans," &c. Quintilian calls him, "subtilis atque elegans, et quo nihil, si Oratorio satis sit docere, quæras perfectius. Nihil enim est inane, nihil arcessitum: puro tamen fonti, quam magno flumini, proprior." Plutarch and Photius relate, that 425 orations were formerly exhibited under the name of Lysia; of which 34 only are now extant. The best editions are those of Taylor in 1739 and 1740, and Reiske in 1772. The "Lectiones Lysiacæ," of Taylor present us with much curious and interesting information.

LYSIMA'CHIA. Loose-strife. In botany, a genus of the class pentandria, order monogynia, corol wheel-shaped; capsule globular, mucronate, ten-valved. Twenty species. Europe, Asia, America; four common to the wet meeds, wet woods, and moist shades of our own country. Four or five species are propagated in our gardens, and are hardy herbaceous triennials and peren-

# BOTANY.

PL. CXVII.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nials, rising with erect stalks from a foot and half to three feet high, terminating with spreading flowers of a white; the peduncles of some of them are one-flowered.

Lysima'chia nummularia. The systematic name of the money-wort. See Nummularia.

Lysima'chia purpurea, (*Lysimachia*, *æ*. f. from *Lysimachus*, who first discovered it.) The herb, root, and flowers of this plant, *Lythrum salicaria* of Linnéus, possess a considerable degree of astringency, and are used medicinally in the cure of diarrhæas and dysenteries, fluor albus, and hymoptysis. See Lythrum.

LYSIMACHUS. Ancient writers have mentioned many of this name, the most remarkable is a son of Agathocles, who was among the generals of Alexander. After the death of that monarch, he sided with Cassander and Seleucus against Antigonus and Demetrius, and fought with them at the celebrated battle of Ipsus. He afterwards seized and expelled Pyrrhus from the throne of Macedonia, B. C. 286; but his cruelty, and the murder of his son so offended his subjects, that the most powerful revolted, and abandoned the kingdom. He declared war against Seleucus, who had given them a kind reception, and was killed in a bloody battle, 211 years B. C. in the 80th year of his age, and his body was found in the heaps of slain only by the fidelity of a little dog, who had carefully watched near it. Justin relates that being cast into the den of a hungry lion, by order of Alexander, for having given poison to Calisthenes (*vid.* Colisthenes) to save him from ignominy, he wrapped his hand in his mantle, and boldly thrusted it into the lion's mouth, and by twisting his tongue, immediately killed the beast. This act of courage recommended him greatly to Alexander. He was pardoned, and ever after esteemed by the monarch. *Justin. Diod.* &c.

LYSIPPUS, a famous statuary of Sicyon, originally a white-smith, who afterwards applied himself to painting, and next to sculpture. He flourished about 325 years before the Christian era, in the age of Alexander the Great. The monarch was so partial to him, that he forbade any sculptor but Lysippus to make his statue. Lysippus made no less than 600 statues, the most admired of which were those of Alexander; one of Apollo, of Tarentum, 40 cubits high; one of a man coming out of a bath, with which Agrippa adorned his baths; one of Socras; and those of the 25 horsemen who were drowned in the Granicus. These were so valued, that, in the age of Augustus, they were bought for their weight in gold.

LYTHRUM. Willow-herb. Loose-strife. London-strife. In botany, a genus of the class dodecandria, order monogynia. Calyx inferior, twelve-toothed; petals six, inserted into the calyx; capsule two-celled, many seeded. Sixteen species, chiefly natives of the West Indies and South America; a few of Europe, two common to the wet pits and river-banks of our own country.

D. acuminatum, with opposite pointed lanceolate leaves, elongated racemes, solitary peduncles, and lanceolate petals, is often cultivated in our gardens, and is a gaudy flower in July and August. It is a native of Siberia.

LYTTA, in zoology, a genus of the class insecta, order coleoptera. Antennas filiform, feelers four, unequal, the hind ones clavate; thorax roundish, head inflated, gibbous; shells soft, flexile, as long as the abdomen. Thirty-two species, all exotics, but scattered over the globe. Many of these reduced to powder are capable of vesicating the skin on application to the surface of the body. The most curious and valuable in this respect is the Lytta vesicatoria; green, with black antennas. It is the common cantharis vesciatoria, or Spanish fly, of the pharmacopoeias, though this insect is usually, but now found to be erroneously, ranked under the genus Meloe. It inhabits Europe on ash and elder trees. It is used in pharmacy for various purposes, but chiefly for its vesicatory faculty: it multiplies greatly, and has a nauseous smell, not much unlike that of mice.

The female cantharis seems to feel the access of amorous desire in a more violent degree than the male: it is she that courts the male; and in the great act of fecundation, it is she that occupies that place, to which in most animals nature directs the other sex. After impregnation, she deposits her eggs in the ground, where they remain till they have undergone the various changes that are to bring them forth winged cantharides.

When collected and dried, these insects become so light, that fifty of them hardly weigh a dram: it is in that state they are grinded down into the well known powder, which constitutes the basis of the common blistering plaister. Of the other purposes to which they have been applied, ignorance is perhaps better than information; and we freely resign to the annalists of dissipation, the task of recording those vain attempts in which they have been employed by the enervated debaucher to restore his virility. The enterprises of love, like the fatigues of war, require certain intervals of rest and tranquility, without which neither the lover nor the soldier can take the field without hazarding his reputation.

> Militat omnis amans, et habet sua castra cupido, OVID.

LYTTELTON (Edward), lord keeper of the great seal in the reign of Charles I. was born in Shropshire in 1589, and admitted of Christ Church, Oxford, in 1606, from whence he removed to the Inner Temple, where he studied the law, and became eminent. In 1628 he was in parliament, and was appoint-

ed, with Sir Edward Coke, and Sir Dudley Digges, to carry up the Petition of Right to the house of lords. His first preferment was to succeed his father as a Welch judge, after which he was elected recorder of London. In 1634 he was made solicitor-general, and knighted. In 1639 he was appointed chief justice of the common pleas; and in 1640 lord keeper, at which time he was elected Lord Lyttelton. He concurred in the votes for raising an army, and seizing the militia, in 1641, for which he never thoroughly recovered the king's favour, though he attended his majesty to York, and was suffered to keep his post. He died at Oxford in 1645, and was interred in the cathedral of Christ Church. His Reports were published in 1683, folio.

Lyttelton (George), a noble writer, was the eldest son of Sir Thomas Lyttelton, of Hagley in Worcestershire, and born there in 1709. He was educated at Eton school, and then removed to Christ Church, Oxford, where he did not remain long, but set out in 1728 on his travels. On his return he obtained a seat in parliament, and distinguished himself as one of the warmest opponents of Sir Robert Walpole. He was a frequent speaker on the side of opposition, although his father who was one of the lords of the admiralty, always voted with the court. Mr. Lyttelton became secretary to the Prince of Wales, who being driven from St. James's, kept a separate court, and openly countenanced the opposition.

When Mr. Pitt, the late earl of Chatham, lost his commission in the guards, in consequence of his spirited behaviour in parliament, Mr. Lyttelton was in waiting at Leicester-house, and, on hearing the circumstance, immediately wrote these lines:

Long had thy virtue mark'd thee out for fame,
Far, far superior to a cornet's name:
This generous Walpole saw; and, griev'd to find
So mean a post disgrace that noble mind,
The servile standard from thy free-born hand
He took, and bade thee lead the patriot-band.

In 1741, Lyttelton married Miss Lucy Fortescue, sister of Lord Fortescue, of Devonshire, by whom he had a son and two daughters. This amiable woman died in 1747, and her husband bewailed his loss in a most beautiful monody to her memory. In 1749 he married the daughter of Sir Robert Rich, but this marriage did not repair the former breach. When Sir Robert Walpole retired, Lyttelton was made one of the lords of the treasury. In 1747 he published his Observations on the Conversion and Apostleship of St. Paul, a work superior to all praise. He acknowledges that in his juvenile days he had been led into scepticism; but maturer research and conviction made him a Christian. In 1751 he succeeded to the title of baronet by the death of his father; and in 1754 he was made cofferer and privy-counsellor. In 1757 he was raised to the peerage. His last literary work was the History of Henry II. which appeared in 1764, after a great application of twenty years. This work reached a third edition in 1768, and does honour to his lordship's judgment and candour. He died the death of a Christian in 1770. Besides the performances above mentioned, he wrote Poems, Persian Letters, and Dialogues of the Dead.

# M



M. A liquid consonant and the twelfth letter in the alphabet.

It has one unvaried sound, and is pronounced by striking the upper lip against the lower; in which the pronunciation of this letter agrees with that of *b*; the only difference between the two consisting in a little motion made in the nose in pronouncing *m*, and not in *b*: whence it happens, that those who have taken cold, for *m* ordinarily pronounce *b*; the nose, in that case, being disabled from making the necessary motion.

All consonants are formed with the aid of vowels; in *em* the vowel precedes, in *be* it follows: and *m* is never mute.

Quintilian observes, that the *m* sometimes ends Latin words, but never Greek ones; the Greeks always changing it in that case into *n*, for the sake of the better sound. M is also a numeral letter, and among the ancients was used for a thousand; according to the verse,

*M caput est numeri, quem scimus mille teneri.*

When a dash is added at the top of it, as $\overline{\text{M}}$; it signifies a thousand times a thousand.

M as an abbreviate stands for Manlius, Marcus, Martius, and Mucius: M. A. signifies *magister artium*, or master of arts; MS. manuscript, and MSS. manuscripts.

M. in astronomical tables, and other things of that kind, is used for meridional or southern; and sometimes for meridian, or midday.

M. in law, the brand or stigma of a person convicted of man-slaughter, and admitted to the benefit of his clergy. It is to be burnt on the brawn of his left thumb.

M. in medicine has two significations: when herbs, flowers, chips, or such-like substances are ordered, in a prescription, and M. follows them, it signifies *manipulus*, a handful; and when any quantity of other ingredients is directed, it is a contraction of *misce*; thus *m. f. mist.* signifies, mix and make a mixture.

MABA, in botany, a genus of the class diœcia, order triandria, male calyx, three-cleft; corol three cleft. Fem; calyx three-cleft; corol doubtful; drupe superior, two-celled. One species, a tree of the Friendly Islands, with hairy twigs and small villous flowers.

MA'BE. Pipe-wood. In botany, a genus of the class monœcia, order hexandria. Calyx one-leafed; five-toothed; corolless male; filaments from nine to twelve, inserted in the bottom of the calyx. Fem: Germ one; style one; stigmas three, revolute; capsule three-celled, three-seeded, covered with a thick bark. Two species; shrubs of Guiana.

MACACO, or MACAUCO. See LEMUR.

MACAO, a town of China, in the province of Canton, seated in an island at the mouth of the river Tae. The Portuguese have been in possession of the harbour for 150 years. Formerly they had a great trade here; but now they have only a fort with a small garrison. The houses are built after the European manner; and there is a Chinese mandarin, as well as a Portuguese governor, to take care of the town and the neighbouring country. Lon. 112. 13. E. Lat. 22. 12. N.

MACAO, in ornithology. See PSITTACUS.

MACARIANS, in ecclesiastical history, the followers of Macarius, an Egyptian monk, who was distinguished towards the close of the fourth century for his sanctity and virtue. In his writings there are some superstitious tenets, and also certain opinions that seem tainted with Origenism. The name has been also applied to those who adopted the sentiments of Macarius, a native of Ireland, who, about the close of the ninth century, propagated in France the error afterwards maintained by Averhoes.

MACAR, a son of Criasius, or Crinacus, the first Greek who led a colony to Lesbos. His four sons took possession of the four neighbouring islands, Chios, Samos, Cos, and Rhodes, which were called the seats of the Macares, or the blessed (μακαρ, *beatus*.)

MACARIA, an ancient name of Cyprus.

MACAYONI. See FOLENGIO, and the next article.

MACARONIC, or MACARONIAN, a kind of burlesque poetry, consisting of a jumble of words of different languages, with words of the vulgar tongue Latinized, and Latin words modernized. *Maccaroni* among the Italians, as has been observed by Cælius Rhodiginus, signifies *a coarse clownish man*; and because this kind of poetry is patched out of several languages, and full of extravagant words, &c. the Italians, among whom it had its rise, gave it the name of maccaronian, or maccaronic poetry. Others choose to derive it á macaronibus, from macaroons, a kind of confection made of meal not boulted, sweet almonds, sugar, and the white of eggs, accounted a great dainty among the country-people in Italy; which, from their being composed of various ingredients, occasioned this kind of poetry, which consists of Latin, Italian, Spanish, French, English, &c. to be called by their

name. Example.—A bold fellow in the macaronic style says,

Enfilavi omnes scadrones & regimandus, &c. Another example:

Archelos pistoliferos furiamque manantum,

Et grandem esmentam quæ inopinum facta ruelle est:

Toxinumque alto troublantem corda clochero, &c.

Theoph. Folengius, a Benedictine monk of Mantua, was the first who invented, or at least cultivated, this kind of verse.

MACARO'ON, *s.* (*macarone*, Italian.) 1. A coarse, rude, low fellow: whence macaronick poetry, in which the language is purposely corrupted (*Donne*). 2. (Macaron, French) a kind of sweet biscuit, made of flower, almonds, eggs, and sugar.

MACASSAR, a seaport of the island of Celebes, and capital of a kingdom called Macassar or Bony, the king of which is in alliance with the Dutch, at the mouth of a considerable river, which forms a harbour. The houses are of wood, and built upon piles, to preserve them from inundations, for which reason they must be entered by ladders. Lon. 117. 28. E. Lat. 5. 10. S.

MACASSAR (Straits of), the channel, or narrow sea, between the islands of Celebes and Borneo.

Macassar poison, in natural history, called ippo, in the Macassar and Malayan tongue, is the gum of a certain tree, shining, brittle, black, and every way like stone-pitch, growing in the island Celebes, in the South Seas; with which all the natives arm themselves in travel, having a long hollow trunk of a hard red-wood like brasil, accurately bored, and at one end is fixed a large lance-blade of iron. Then they make a small arrow, very straight, and somewhat bigger than a large wheaten straw: at one end they fix it into a round piece of white, light, soft wood, like cork, about the length of the little finger, just fit for the bore of the trunk, to pass clear by the force of one's breath, and to fill it so exactly, that the air may not pass by, but against it, in order to carry it with the greater force. At the other end they fix it either in a small fish-tooth for that purpose, or make a blade of wood of the bigness of the point of a lancet, about three-quarters of an inch long, and making a little notch in the end of the arrow, they strike it firm therein, which they anoint with poison. The poisonous gum, when gathered, it put into hollow bamboos or canes, stopped up very close, and thus brought to Macassar. When they fit it for use, they take a piece of smooth turtle-shell, and a stick cut flat and smooth at the end: then they take green galangal root, grate it, and with the addition of a little fair water, press the juice into a clean China dish: then with a knife, scraping a little of the poison upon the shell, dip the end of the stick in the forementioned liquor, and with this dissolve the poison, to the consistence of a syrup: when this is done, they anoint the fish-tooth or wooden-blade with the same stick and lay them in the sun, so that it may be baked hard. The pointed arrows thus prepared are put in hollow bamboos, close shut, and in this state they retain their virtue for a month. Birch's Hist. of the Royal Society, vol. ii. p. 44.

MACAU, a town of France, in the department of the Gironde, and chief place of a canton, in the district of Bourdeaux: ten miles N. Bourdeaux.

Macau *tree*, in botany. See Cocos.

MACAULEY (Catherine), a female writer, was the daughter of John Sawbridge, Esq. of Ollantigh in Kent. In 1760, she married Dr. George Macauley, a physician, who left her a widow. In 1778 she married a younger brother of the famous quack, Dr. Graham. She died in 1791. Her works are, 1. The History of England from James I. to the Accession of the House of Brunswick; once very popular, but now sunk into contempt. 2. Remarks on Mr. Hobbes's Rudiments of Government and Society, 8vo. 3. Thoughts on the Causes of the present Discontents, 8vo. 4. A History of England from the Revolution to the present Time, in a series of Letters to a Friend, 1778, 1 vol. 4to. 5. A Treatise on the Immutability of Moral Truth, 8vo. 6. Letters on Education, 8vo. Dr. Wilson, prebendary of Westminster, had so great an esteem for her abilities, as to place a statue of her, in the character of Liberty, in his parish church of Walbrook. His successor very properly removed this extravagant production of folly and enthusiasm.

MACCABÆUS (Judas.) See Judas.

MACCABEES, two apocryphal books of Scripture, containing the history of Judas and his brothers, and their wars against the Syrian kings in defence of their religion and liberties, so called from Judas Mattathias, surnamed Maccabeus, as some say from the word מכבי, formed of the initials of מי כמכה באלם יהוה, q. d. *Who is like unto thee, O Lord, among the Gods?* which was the motto of his standard; whence those who fought under his standard were called Maccabees, and the name was generally applied to all who suffered in the cause of the true religion, under the Egyptian or Syrian kings. The first book of the Maccabees is an excellent history, and comes nearest to their style and manner of the sacred historians of any extant. It was written originally in the Chaldee language of the Jerusalem dialect, and was extant in this language in the time of Jerom. From the Chaldee it was translated into Greek, from the Greek into Latin. It is supposed to have been written by John Hyrcanus, the son of Simon, who was prince and high-priest of the Jews near thirty years, and

began his government at the time where this history ends. It contains the history of 40 years, from the reign of Antiochus Epiphanes to the death of Simon the high-priest; that is, from the year of the world 38—59, to the year 3869; 131 years B. C. The second book of the Maccabees begins with two epistles sent from the Jews of Jerusalem to the Jews of Egypt and Alexandria; to exhort them to observe the feast of the dedication of the new altar erected by Judas on his purifying the temple. The first was written in the 169th year of the era of the Seleucidæ, *i. e.* B. C. 144; and the second in the 188th year of the same era, or 125 B. C.; and both appear to be spurious. After these epistles follows the preface of the author to his history, which is an abridgement of a larger work, composed by one Jason, a Jew of Cyrene, who wrote in Greek the history of Judas Maccabeus and his brethren, and the wars against Antiochus Epiphanes, and Eupator his son. This second book does not by any means equal the accuracy and excellency of the first. It contains a history of about fifteen years, from the execution of Heliodurus's commission, who was sent by Seleucus to fetch away the treasures of the temple, to the victory obtained by Judas Maccabeus over Nicanor; that is, from the year of the year of the world 3828 to the year 3843, 147 years B. C.

MACBETH, a Scots nobleman in the 11th century, nearly allied to Duncan king of Scotland. Not contented with curbing the king's authority, he carried his pestilent ambition so far as to put him to death; and, chasing Malcolm Kenmure his son and heir into England, usurped the crown. Siward earl of Northumberland, whose daughter Duncan had married, undertook, by order of Edward the Confessor, the protection of the fugitive prince. He marched with an army into Scotland; defeated and killed Macbeth; and restored Malcolm to the throne of his ancestors. Shakspeare has made this transaction the subject of one of his best tragedies.

MACCAW, in Ornithology. See PIPER.

MACCLESFIELD, a corporate town in Cheshire, with a market on Monday. It is governed by a mayor, has manufactures of mohair, twist, hatbands, buttons, and thread, and mills for the winding of silk. It is seated at the edge of a forest of the same name, near the river Bolin, 36 miles east of Chester, and 171 north-west of London. Lon. 2. 17. W. Lat. 53. 15. N.

MACE. *s.* (mæzza, Saxon; *masa*, Spanish.) 1. An ensign of authority born before magistrates (*Spenser*). 2. (*Massue*, French; *massa*, Latin.) A heavy blunt weapon; a club of metal (*Knolles*).

MACE, in botany. See MYRISTICA.

MACE-*reed*. See TYPHA.

MACE, the second coat or covering of the kernel of the nutmeg, is a thin and membranaceous substance, of an oleaginous nature, and a yellowish colour; being met with in flakes of an inch and more in length, which are divided into a multitude of ramifications. It is of an extremely fragrant, aromatic, and agreeable flavour, and of a pleasant, but acrid and oleaginous taste.

MACEA'LE. *s.* (*mace* and *ale.*) Ale spiced with mace (*Wiseman*).

MA'CEBEARER. *s.* (*mace* and *bearer.*) One who carries the mace before persons in authority (*Spectator*).

MACEDON, or MACEDONIA, a most celebrated kingdom of antiquity, was bounded on the east by the Ægean sea; on the south by Thessaly and Epirus; on the west by the Ionian sea or Adriatic; on the north at first by the river Straymon, and the Scandian mountains, but afterwards by the river Nessus, or Nestus. In a direct line the whole country extended only 150 miles in length; but the windings of the coast lengthened it out to three times that extent, in which almost every convenient situation was occupied by a Grecian sea-port. The country was naturally divided by the Thermaic and Strymonic gulphs, into the provinces of Pieria, Chalcis, and Pangæus. The middle region, which took its name from a city of Eubœa from whence it was originally peopled, was very fertile and pleasant; the inland country, being diversified by lakes, rivers, and arms of the sea, was extremely convenient for inland navigation, while the towns of Amphipolis, Potidæa, Acanthus, and many others, afforded marts for the commerce of the republics of Greece, as well as of Thrace and Macedon. On one side of this district were the mountains of Pangæus, and on the other the plains of Pieria. The Pangæan mountains, which extended 90 miles towards the east, and the river Nessus, though proper neither for corn nor pasture, produced plenty of timber for ship-building; while the southern branches of the mountain contained rich veins of gold aud silver: but these, though wrought successively by the Thasians and the Athenians, were only brought to perfection by Philip of Macedon, who extracted from them gold and silver to the value of 200,000l. sterling annually. Pieria extended 50 miles along the Thermaic gulph, to the confines of Thessaly and Mount Pindus. The inland part of the country was beautifully diversified with shady hills and fountains; and so admirably calculated for solitary walks and retirement, that the ancients looked upon it to be the favourite haunt of the muses, and accordingly bestowed upon them the title of Pierides.

In the most early times this country was called Æmathia, from Æmathius, one of its princes. The name of Macedon is said to have been derived from Macedo, a descendant of Deucalion; though others suppose it to have been only a corruption of Mygdonia, a district of the country.

MACEDONIA, a province of Turkey in Europe, bounded on the north by Servia and Bulgari, on the east by Romania and Archipelago, on the south by Livadia, and on the west by that country and Albania. Salonichi is the capital.

MACEDONIAN kingdom, in ancient history, one of the four kingdoms into which the empire of Alexander was divided after his death. This kingdom, under Perseus, who was overcome and taken by Æmilius, and carried in triumph to Rome, where he died in prison, was reduced to the form of a Roman province. The other three, viz. the Asiatic, Syrian, and Egyptian kingdoms, flourished for a considerable time under their own kings, but were at last compelled to receive the Roman yoke.

MACEDONIAN *Parsley*. See PETROSELINUM *macedonium* and BUBON.

MACEDONIAN *year*. See YEAR.

MACEDONIANS, in Ecclesiastical History, the followers of Macedonius, bishop of Constantinople, who, through the influence of the Eunomians, was deposed by the council of Constantinople in 360, and sent into exile. He considered the Holy Ghost as a divine energy diffused throughout the universe, and not as a person distinct from the Father and the Son. The sect of Macedonians was crushed before it had arrived at its full maturity, by the council assembled by Theodosius in 381 at Constantinople.

MACER (Æmilius), an old Latin poet, born at Verona, and flourished under Augustus Cæsar. He wrote a poem on birds, serpents, and herbs, which is lost. There is one which passes under his name on the quality of herbs, but it is spurious.

MACER (Lucius Claudius), proprætor of Africa, in the reign of Nero. On the death of that emperor, he assumed the imperial dignity, but was cut off by order of Galba.

MACER, (μακερ; from *masa*, Heb.) Grecian macer. The root of which is imported from Barbary by this name, is supposed to be the simarouba.

MACERATA, a populous town of Italy, in the marquisate of Ancona, with a bishop's see, and a university. It is seated near the mountain Chiento, 12 miles south-west of Loretto. Lon. 13. 27. E. Lat. 43. 20. N.

MACERATA, a town of Naples, in Terra di Lavoro, four miles south of Capua.

*To* MA'CERATE. *v. a.* (*macero*, Latin.) 1. To make lean; to wear away (*Harvey*). 2. To mortify: to harass with corporal hardships (*Burton*). 3. To steep almost to solution (*Arbuthnot*).

MACERA'TION. *s.* (from macerate.) 1. The act of wasting, or making lean. 2. Mortification; corporal hardship.

MACERA'TION, (*Maceratio*, *onis*, Fr. from *macero*, to soften by water.) In a pharmaceutic sense implies an infusion either with or without heat, wherein the ingredients are intended to be almost wholly dissolved in order to extract their virtues.

MACHECOUL, a town of France, in the department of Lower Loire, seated on the Tenu, 20 miles south-west of Nantes. Lon. 1. 11. W. Lat. 47. 2. N.

MACHERRY, a town of Hindoostan Proper, in the country of Mewat, 70 miles south south-west of Delhi.

MACHIA, a town of Naples, in the Molise, 12 miles south-west of Molise.

MACHIAN, one of the Molucca islands, 20 miles in circumference, and the most fertile of them all. It produces the best cloves; and the Dutch have here three inaccessible forts. Lon. 126. 55. E. Lat. 0. 2. S.

MACHIAVEL (Nicolas), a celebrated Florentine writer, born in 1469. He wrote some comedies, and other works, but that by which he is best known is his Prince, a treatise on Politics, the design of which is to describe the arts of government, as they are commonly practised by wicked princes and tyrants. It is a matter of question whether Machiavel intended to lay down rules for governors, or only to expose the wickedness of oppressors. At first this work met with no opposition, but Pope Clement VIII. condemned his writings. Machiavel died in 1530. His works were published in English by Mr. Farneworth, in 1761, 2 vols. 4to.

MACHIAVE'LIAN. *a.* artful designing (*Watkins*).

MACHICACO, a promontory of Spain, in the bay of Biscay. Lon. 3. 0. W. Lat. 43. 37. N.

MA'CHINAL. *a.* (from *machina*, Lat.) Relating to machines.

*To* MA'CHINATE. *v. a.* (*machinor*, Latin.) To plan; to contrive.

MACHINA'TION. *s.* (*machinatio*, Latin.) Artifice; contrivance; malicious scheme (*Sprat*).

MACHINE, (*Machina*), in the general signifies any thing that serves to augment or to regulate moving powers: or it is any body destined to produce motion, so as to save either time or force. The word comes from the Greek μαχανη, "machine, invention, art:" And hence, in strictness, a machine is something that consists more in art and invention, than in the strength and solidity of the materials; for which reason it is that the inventors of machines are called ingenieurs or engineers.

The denomination machine is now vulgarly given to a great variety of subjects, which have very little analogy by which they can be classed with propriety under any one name. We say a travelling machine, a bathing machine, a copying machine, a threshing machine, an electrical machine, &c. &c. The only circumstance in which all these agree seem to be, that their construction is more complex and artificial than the utensils, tools, or instruments which offer themselves to the first thoughts of uncultivated people. They are more artificial than the common

cart, the bathing tub, or the flail. In the language of ancient Athens and Rome, the term was applied to every tool by which hard labour of any kind was performed; but in the language of modern Europe, it seems restricted either to such tools or instruments as are employed for executing some philosophical purpose, or of which the construction employs the simple mechanical powers in a conspicuous manner, in which their operation and energy engage the attention. An electrical machine, a centrifugal machine, are of the first class; a threshing machine, a fire machine, are of the other class. It is nearly synonymous, in our language, with engine; a term altogether modern, and in some measure honourable, being bestowed only, or chiefly, on contrivances for executing work in which ingenuity and mechanical skill are manifest. Perhaps, indeed, the term engine is limited, by careful writers, to machines of considerable magnitude, or at least of considerable art and contrivance. We say, with propriety, steam engine, fire-engine, plating-engine, boring-engine; and a dividing machine, a copying machine, &c. Either of these terms, machine or engine, are applied with impropriety to contrivances in which some piece of work is not executed on materials which are then said to be manufactured. A travelling or bathing machine is surely a vulgarism. A machine or engine is therefore a tool; but of complicated construction, peculiarly fitted for expediting labour or for performing it according to certain invariable principles: and we should add, that the dependence of its efficacy on mechanical principles must be apparent, and even conspicuous. The contrivance and erection of such works constitute the profession of the engineer; a profession which ought by no means to be confounded with that of the mechanic, the artisan, or manufacturer. It is one of the artes liberales; as deserving of the title as medicine, surgery, architecture, painting, or sculpture. Nay, whether we consider the importance of it to this flourishing nation, or the science that is necessary for giving eminence to the professor, it is very doubtful whether it should not take place of the three last named, and go pari passu with surgery and medicine.

Machines are either simple or compound. The simple machines are the mechanical powers, viz. the lever, the wheel and the axis, the pulley, the inclined plane, the wedge and the screw. See Mechanics.

These simple machines serve for different purposes, and it is the business of the skilful mechanician to select and combine them in such a manner, as may be best adapted to produce the effect of which he stands in need. Compound machines are formed from these simple ones. These may be indefinitely varied, and they belong to all the branches of science. Descriptions of many of the most useful, and which serve to exhibit the principles of machinery, will be found in various parts of our work. See Engine, Hydraulics, Pneumatics, &c. &c.

The modes of applying mechanical forces are almost as various as the machines that are constructed, and the purpose for which they are employed. In general the human strength is applied by means of levers, or winches, or by walking wheels, which slide beneath them as they attempt to ascend. The force of other animals is applied by a horizontal arm projecting from a vertical axis, to which they are harnessed. When motion is simply communicated to a substance placed before the moving body, such materials are used as are capable of exerting a repulsive force; but when the body to be moved is behind the moving power, and is pulled along with it, chains or ropes are sometimes more convenient. When the direction of motion communicated is also to be changed, levers or cranks may be employed, united by joints or hinges of various kinds. Sometimes a long series of connected rods is suspended by other rods or chains, so as to convey the effect of the force to a considerable distance; in this case the motion is generally alternate, as when pumps are worked by means of a water-wheel at a distance from the shafts in which the pumps are placed. For the communication of a rotatory motion, Dr. Hooke's universal joint, formed by a cross, making the diameters of two semicircles, one of which is fixed at the end of each axis, is frequently used. The best mode of connecting a rotatory motion with an alternate one is, in all common cases, to employ a crank, acting on one end of a long rod which has a joint at the other. If the rotatory motion of the crank be equable, the progressive motion of the rod will be gradually accelerated and retarded, and for a considerable part of the revolution the force exerted will be nearly uniform. The force applied to a machine may, in general, be divided into two portions, the one employed in opposing another force, so as to produce equilibrium only, the other in generating momentum. With respect to the first portion, a single crank has the inconvenience of changing continually the mechanical advantage of the machinery; with regard to the second, its motion in the second quarter of its revolution is accelerated, instead of being retarded, by the inertiæ which this portion of the force is intended to overcome, hence the motion is irregular. This difficulty may be remedied by employing cranks in pairs, one of which being fixed so as to make a right angle with the other, which is moreover the best position for two winches to be turned by two labourers; since the point of the circle, in which a man can exert his greatest strength, is nearly at the distance of a right angle, or a little more from the point at which his force is smallest. But of all the modes of communicating motion, the most extensively useful is employment of wheel-work, which is capable of varying its direc-

tion and its velocity without any limit. See Wheel-*work*.

Machines, used in war amongst the Greeks were principally these. 1. Κλιμακες, or scaling ladders; 2. The battering ram; 3. The helepolis; 4. The χελωνη or tortoise, called by the Romans testudo; 5. The χωμα or agger, which was faced with stone, and raised higher than the wall; 6. Upon the χωμα were built πυργοι or towers of wood; 7. Γερραι, or osier hurdles; 8. Catapultæ, or καταπελται, from which they threw arrows with amazing force; and, 9. The λιθοβολοι, πετροβολοι, or αφετηρια, from which stones were cast with great velocity. The principal warlike machines made use of by the Romans were, the ram, the lupus or wolf, the testudo or tortoise, the balista, the catapulta; and the scorpion.

Accurate drawings and descriptions of machines would be a very curious and useful work. But to make a collection of this kind as beneficial as possible, it should contain also an analysis of them; pointing out their advantages and disadvantages, with the reasons of the constructions; also the general problems implied in these constructions, with their solutions, should be noticed. Though a complete work of this kind be still wanting, yet many curious aud useful particulars may be gathered from Strada, Besson, Beroaldus, Augustinus de Ramellis, Bockler, Leupold, Beyer, Limpergh, Van Zyl, Perault, and others; a short account of whose works may be found in Wolsii Commentatio de Præcipuis Scriptis Mathematicis; Elem. Mathes. Univ. tom. 5, pa. 84. To these may be added, Belidor's Architecture Hydraulique, Desagulier's Course of Experimental Philosophy, and Emerson's Mechanics, the second volume of Prony's Architecture Hydraulique, and the 2d vol. of Gregory's Mechanics, which latter volume contains a more complete connection of mechanics than any other English work. The Royal Academy of Sciences at Paris have also given a collection of machines and inventions approved of by them. This work, published by M. Gallon, consists of eight volumes in quarto, containing engraved draughts of the machines, with their descriptions annexed. We ought also to mention Bailey's valuable collection of machines approved by the Society of Arts; and the Repertory of Arts and Manufactures, the several volumes of which contain the specifications of all the most curious and useful *patent* machines which have been invented in the course of the last half century.

On the maximum effects of machines in motion, the reader may consult Gregory's Mechanics, vol. 1. Brewster's Fergusor, vol. 2., and the article Machinery in the Supplement to the Encyclopædia Britannica.

Blowing *machine*. See Bellows and Blowing.

Electric *machine*. See Electricity.

Machine *of marli*. See Marli.

Machine, in dramatic poetry, is when the poet brings some divinity or supernatural being upon the stage; to perform some exploit, or solve some difficulty, out of the reach of human power.

The machines of the drama are gods, angels, ghosts, &c. They are so called from the machines or contrivances by which they are represented upon the stage; and afterwards removed again.

Hence the use of the word machine has also passed into epic poetry; though the reason of the name may be there wanting.

MACHI'NERY, *s.* (from *machine.*) 1. Enginery; complicated workmanship. 2. The machinery signifies that part which the deities, angels, or demons, act in a poem (*Pope*).

Machi'nery, in epic and dramatic poetry, is when the poet introduces the use of machines; or brings some supernatural being upon the stage, in order to solve some difficulty or to perform some exploit out of the reach of human power. The ancient dramatic poets never made use of machines, unless where there was an absolute necessity for so doing: whence the precept of Horace:

> Nec Deus intersit, nisi dignus vindice nodus
> Inciderit.

It is quite otherwise with epic poets, who introduce machines in every part of their poems; so that nothing is done without the intervention of the Gods. In Milton's Paradise Lost, by far the greater part of the actors are supernatural personages: Homer and Virgil do nothing without them: and, in Voltaire's Henriade, the poet has made excellent use of St. Louis. As to the manner in which these machines should act, it is sometimes invisibly, by simple inspirations and suggestions; sometimes by actually appearing under some human form; and, lastly, by means of dreams and oracles, which partake of the other two. All these however should be managed in such a manner as to keep within the bounds of probability.

MACHINIST. *s.* (*machiniste*, French.) A constructor of engines or machines.

MACHUL, an instrument of music among the Hebrews, of which we know not enough to attempt a description.

MACHYNLETH, a town in Montgomeryshire, with a market on Monday, seated on the Douay, over which is a stone bridge leading into Merionetshire. It is 37 miles west of Montgomery, and 198 north west of London. Lon. 3. 45. W. Lat. 52. 24. N.

MA'CIES, (*Macies*, *ei.* f.) A wasting of the body. See Atrophy and Tabes.

MA'CILENCY. *s.* (from *macilent.*) Leanness.

MA'CILENT. *a.* (*macilentus*, Latin.) Lean.

MACIS, (*Macis*, *idis* f.) Mace. A thick, tough, reticulated, unctuous membrane, of a lively reddish, yellow colour, approaching to that of saffron, which envelopes the shell

of the nutmeg. See Nux *moschata*. The mace, when fresh, is of a blood red colour, and acquires its yellow hue in drying. It is dried in the sun upon hurdles fixed above one another, and is then, as it is said, sprinkled with sea water, to prevent its crumbling in carrying. It has a pleasant aromatic smell, and a warm, bitterish, moderately pungent taste. It is in common use as a grateful spice, and appears to be in its general qualities nearly similar to the nutmeg. The principal difference consists in the mace being much warmer, more bitter, less unctuous, and sitting easier on weak stomachs.

MACKAREL, in Ichthyology. See Scomber.

MACKENZIE (sir George), an ingenious Scotch writer, was born at Dundee in 1636, and educated at St. Andrew's and Aberdeen. In 1656 he became an advocate, and distinguished himself so much as a pleader, that he was appointed judge in the criminal court, and king's advocate. When James II. abrogated the papal laws, he resigned his places, but was restored again by that prince. Not approving the measures of the prince of Orange, he once more gave up his posts, and retired to England. He died in London in 1691. He wrote several pieces on the laws of Scotland; a Defence of the antiquity of the royal line of Scotland 8vo.; essays on moral subjects; and some poetical pieces.

MACKERAN, a province of Persia, bounded on the north by Segestan and Sablestan, on the east by Hindoostan Proper, on the south by the Arabian Sea, and on the west by Kerman. It is tributary to the sultan of Candahar: and the capital of the same name, is 100 miles north west of Tatta. Lon. 66. 0. E. Lat. 26. 0. N.

MACKLIN (Charles), an actor, and dramatic writer, was born in the north of Ireland in 1690. His real name was Mac Laughlin, which he altered to Macklin. He became a performer in the Lincoln's-inn company in 1725, and long after was tried for killing a brother comedian in a quarrel, and found guilty of manslaughter. He had an extraordinary set of features, which made Quin say, "If God writes a legible hand, that fellows a villain." His greatest character was Shylock, and his performance of it drew from Mr. Pope the following couplet:

This is the Jew
That Shakspeare drew.

Macklin wrote two plays, Love-à-la-Mode, and the Man of the World, which possess some merit. He was, notwithstanding the repugnance of his countenance, a man of extensive liberality. His last appearance on the stage was at Covent-Garden theatre, Jan. 10, 1790, in the character of Shylock, at his own benefit; but his memory failed him, and he could not go through with the part. He died in 1797 (*Watkins*).

MACLAURIN (Colin), in biography, a most eminent mathematician and philosopher, was the son of a clergyman, and born at Kilmoddan in Scotland, in the year 1698. He was sent to the university of Glasgow in 1709; where he continued five years, and applied to his studies in a very intense manner, and particularly to the mathematics. His great genius for mathematical learning discovered itself so early as twelve years of age; when, having accidentally met with a copy of "Euclid's Elements" in a friend's chamber, he became in a few days master of the first six books without any assistance; and, it is certain, that in his sixteenth year he had invented many of the propositions which were afterwards published as part of his work, entitled, "Geometriæ Organica." In his fifteenth year he took the degree of Master of Arts; on which occasion he composed, and publicly defended, a thesis on the power of gravity, with great applause. After this he quitted the university, and retired to a country seat of his uncle, who had the care of his education; his parents being dead some time. Here he spent two or three years in pursuing his favourite studies; but in 1717, at nineteen years of age only, he offered himself a candidate for the professorship of mathematics, in the Marischal College of Aberdeen, and obtained it after a ten day's trial, against a very able competitor.

In 1719, Mr. Maclaurin visited London, where he left his "Geometria Organica" to print, and where he became acquainted with Dr. Hoadley, then Bishop of Bangor, Dr. Clarke, Sir Isaac Newton, and other eminent men, at which time also he was admitted a member of the Royal Society; and in another journey in 1721, he contracted an intimacy with Martin Folkes, Esq. the pressdent of it, which continued during his whole life.

In 1722, Lord Polworth, plenipotentiary of the king of Great Britain at the congress of Cambray, engaged Maclaurin to go as a tutor and companion to his eldest son, who was then to set out on his travels. After a short stay at Paris, and visiting other towns in France, they fixed in Lorrain, where he wrote his piece on the percussion of bodies, which gained him the prize of the Royal Academy of Sciences for the year 1724. But his pupil dying soon after at Montpellier, he returned immediately to his profession at Aberdeen. He was hardly settled here when he received an invitation to Edinburgh; the curators of that university being desirous that he should supply the place of Mr. James Gregory, whose great age and infirmities had rendered him incapable of teaching. He had here some difficulties to encounter, arising from competitors, who had good interest with the patrons of the university, and also from the want of an additional fund for the new professor; which, however, at length were all surmounted, principally by the means of Sir Isaac Newton. Accordingly, in November 1725, he was introduced into the university, as was at the same time his learned colleague and intimate friend, Dr. Alexander Munro, professor of anatomy. After this, the mathematical classes soon became very numerous, there being generally upwards of 100 students attending his lectures every year; who being of different standings and proficiency, he was obliged to divide them into four or five classes, in each of which he employed a full hour every day from the first of November to the first of June. In the first class he taught the

first 6 books of Euclid's Elements, Plane Trigonometry, Practical Geometry, the Elements of Fortification, and an Introduction to Algebra. The second class studied Algebra, with the 11th and 12th books of Euclid, Spherical Trigonometry, Conic Sections, and the general Principles of Astronomy. The third went on in Astronomy and Perspective, read a part of Newton's Principia, and had performed a course of experiments for illustrating them: he afterwards read and demonstrated the Elements of Fluxions. Those in the fourth class read a System of Fluxions, the Doctrine of Chances, and the remainder of Newton's Principia.

In 1734, Dr. Berkley, Bishop of Cloyne, published a piece called The Analist; in which he took occasion, from some disputes that had arisen concerning the grounds of the fluxionary method, to explode the method itself; and also to charge mathematicians in general with a strong tendency to infidelity as to matters of religion. Maclaurin thought himself included in this charge, and began an answer to Berkeley's book: but, as he proceeded, so many discoveries, so many new theories and problems occurred to him, that, instead of a vindicatory pamphlet, his work came out a complete system of Fluxions, with their application to the most considerable problems in geometry and natural philosophy. This work was published at Edinburgh in 1742, 2 vols 4to; and as it cost him infinite pains, so it is the most considerable of all his works, and will do him immortal honour. In the mean time, he was continually obliging the public with some performance or observation of his own; many of which were published in the fifth and sixth volumes of the "Medical Essays" at Edinburgh. Some of them were likewise published in the Philosophical Transactions; as the following: 1. Of the construction and measure of curves, No. 356. 2. A new method of describing all kinds of curves, No. 359. 3. A letter to Martin Folkes, Esq. on equations with impossible roots, May 1726, No. 394. 4. Continuation of the same, March 1729, No. 408. 5. December the 21st, 1732, on the description of curves; with an account of farther improvements, and a paper dated at Nancy, Nov. 27, 1722, No. 439. 6. An account of the treatise of fluxions, Jan. 27, 1742, No. 467. 7. The same continued, March 10, 1742, No. 469. 8. A rule for finding the meridional parts of a spheroid with the same exactness as of a sphere, August 1741, No. 461. 9. Of the basis of the cells wherein the bees deposit their honey; Nov. 3, 1734, No. 471.

In the midst of these studies, he was always ready to lend his assistance in contriving and promoting any scheme which might contribute to the service of his country. When the Earl of Morton set out in 1759 for Orkney and Shetland, to visit his estates there, he desired Mr. Maclaurin to assist him in settling the geography of those countries, which is very erroneous in all our maps; to examine their natural history, to survey the coasts, and to take the measure of a degree of the meridian. Maclaurin's family affairs, and other connections, would not permit him to do this: he drew, however, a memorial of what he thought necessary to be observed, furnished the proper instruments, and recommended Mr. Short, the famous optician, as a fit operator for the management of them. He had still another scheme for the improvement of geography and navigation, of a more extensive nature; which was the opening a passage from Greenland to the South Sea by the north pole. That such a passage might be found, he was so fully persuaded, that he has been heard to say, if his situation could admit of such adventures, he would undertake the voyage, even at his own charge. But when schemes for finding it were laid before the parliament in 1741, and himself consulted by several persons of high rank concerning them, before he could finish the memorials he proposed to send, the premium was limited to the discovery of a north-west passage; and he used to regret, that the word West was inserted, because he thought that passage, if at all to be found, must lie not far from the pole.

In 1745, having been very active in fortifying the city of Edinburgh against the rebel army, he was obliged to fly from thence to the north of England; where he was invited by Herring, then Archbishop of York, to reside with him during his stay in this country. In this expedition, however, being exposed to cold and hardships, and naturally of a weak and tender constitution, he laid the foundation of an illness which put an end to his life, in June 1746, at the age of 48.

Mr. Maclaurin was a very good as well as a very great man, and worthy of love as well as admiration. His peculiar merit as a philosopher was, that all his studies were accommodated to general utility; and we find, in many places of his works, an application even of the most abstruse theories to the perfecting of mechanical arts. He had resolved, for the same purpose, to compose a course of practical mathematics, and to rescue several useful branches of the science from the bad treatment they often met with in less skilful hands. But all this his death prevented; unless we should reckon, as a part of his intended work, the translation of Dr. David Gregory's "Practical Geometry," which he revised, and published with additions, 1745. In his lifetime, however, he had frequent opportunities of serving his friends and his country by his great skill. Whatever difficulty occurred concerning the constructing or perfecting of machines, the working of mines, the improving of manufactures, the conveying of water, or the execution of any other public work, he was at hand to resolve it. He was likewise employed to terminate some disputes of consequence that had arisen at Glasgow concerning the gauging of vessels; and for that purpose presented to the commissioners of excise two elaborate memorials, with their demonstrations, containing rules by which the officers now act. He made also calculations relating to the provision, now established by law, for the children and widows of the Scots clergy, and of the professors in the universities, entitling them to certain annuities and sums, upon the voluntary annual payment of a certain sum by the incumbent. In contriving and adjusting this wise and useful scheme, he bestowed a great deal of labour, and contributed not a little towards bringing it to perfection. It may be said of such a man, that "he lived to some purpose;" which can hardly be said of those, how uncommon soever their abilities and attainments, who spend their whole time in abstract speculations, and produce nothing to the real use and service of their fellow creatures.

Of his works we have mentioned his Geometria Organica, in which he treats of the description of curve lines by continued motion. We need not repeat what has been said concerning his

piece which gained the prize of the Royal Academy of Sciences in 1724. In 1740, the academy adjudged him a prize, which did him still more honour, for solving the motion of the tides from the theory of gravity; a question which had been given out the former year, without receiving any solution. He had only ten days to draw this paper up in, and could not find leisure to transcribe a fair copy; so that the Paris edition of it is incorrect. He afterwards revised the whole, and inserted it in his Treatise of Fluxions; as he did also the substance of the former piece. These, with the Treatise of Fluxions, and the pieces printed in the Philosophical Transactions, of which we have given a list, are all the writings which our author lived to publish. Since his death, two volumes more have appeared; his Algebra, and his Account of Sir Isaab Newton's Philosophical Discoveries. His Algebra, though not finished by himself, is yet allowed to be excellent in its kind; containing, in one volume, a complete elementary treatise of that science, as far as it has hitherto been carried. His Account of Sir Isaac Newton's Philosophy was occasioned in the following manner: Sir Isaac dying in the beginning of 1728, his nephew, Mr. Conduitt, proposed to publish an account of his life, and desired Mr. Maclaurin's assistance. The latter, out of gratitude to his great benefactor, cheerfully undertook, and soon finished, the history of the progress which philosophy had made before Sir Isaac's time, and this was the first draught of the work in hand; which not going forward, on account of Mr. Conduitt's death, was returned to Mr. Maclaurin. To this he afterwards made great additions, and left it in the state in which it now appears. His main design seems to have been, to explain only those parts of Sir Isaac's philosophy which have been, and still are, controverted: and this is supposed to be the reason why his grand discoveries concerning light and colours are but transiently and generally touched upon. For it is known, that ever since the experiments on which his doctrine of light and colours is founded have been repeated with due care, this doctrine has not been contested; whereas his accounting for the celestial motions, and the other great appearances of nature, from gravity, is misunderstood, and even ridiculed by some to this day.

**MACLE**, in mineralogy, a genus of the class earths; order siliceous. Composed of two distinct substances, one of which is of a yellowish-white, or dirty grey colour; the other greyish-black passing to blueish-black. It is met with near St. Brilax in Brittany, imbedded in argillaceous schistus; near Bareges in the Pyrennees; also in primitive argillaceous schist, and likewise at San Jago de Compostella. It occurs crystallized in the form of quadrilateral, and nearly rectangular prisms. It gives a white powder; is soft, passing to moderately hard, and not very brittle.—*Sp. Grav.* 294.

**MACPHERSON** (James), a Scotch writer of some celebrity, was born in 1738. His first work, and that which brought him mostly into notice, was a translation of poems attributed by him to Ossian. These poems certainly possess great beauty; but after they had been published some time, their authenticity was doubted by Dr. Johnson and other writers, while they were as vigorously defended by some men of genius, the principal of whom was Dr. Blair. Mr. Macpherson was greatly irritated at Dr. Johnson's remarks, and wrote him a threatening letter, which the doctor answered in most indignant terms. In 1773 Mr. Macpherson published a translation of the Iliad into heroic prose, but it sunk into contempt. He was also the author of an Introduction to the History of Great Britain and Ireland; and a History of Great Britain from 1660 to the Accession of the House of Hanover, 2 vols. 4to. He was likewise the author of some political pamphlets in defence of Lord North's administration, and obtained a seat in the House of Commons. He died in 1796 (*Watkins*).

**MACQUER** (Joseph), in biography, an eminent chemist, was born at Paris in 1710. He was brought up to physic, and became a doctor of the faculty of medicine, in the University of Paris, professor of pharmacy, and censor royal. He was also a member of the academies of sciences of Turin, Stockholm, and Paris, and he held the medical and chemical departments in the Journal des Savans. M. Macquer made himself well known by several useful and popular works on chemistry, of which science he was one of the most successful cultivators on the modern rational plan, before the new modelling which it has received of late years. His publications were "Elemens de Chymie Pratique," 2 vols. 12mo. 1751-1756. "Plan d'un Cours de Chymie experimentale et raisonnée," 12mo. 1757. This was drawn up in conjunction with M. Baumé, who lectured on chemistry in partnership with him; "Dictionnaire de Chymie," 2 vols. 8vo. 1766. These works have been translated into English and German: the dictionary, particularly by Mr. Keir, with great additions and improvements. He wrote likewise "Formulæ Medicamentorum Magistralium," 1763; and "L'Art de la Teinture de Sore," 1763; and he had a share in the "Pharmacopoeia Parisiensis," of 1758. This meritorious writer died in 1784.

**MACRIN** (Salmon), one of the best Latin poets of the sixteenth century, was born at Loudon. His true name was *John Salmon*; but he took that of *Macrin*, from his being frequently so called in ridicule by Francis I. on account of his extraordinary leanness. He was preceptor to Claudius of Savoy, Count of Tende; and to Honorius the count's brother; and wrote several pieces of poetry in lyric verse, which were so admired, that he was called *the Horace of his time*. He died of old age at Loudon, in 1555. Charles Macrin, his son, was not inferior to him as a poet, and surpassed him in his knowledge of the Greek tongue. He was preceptor to Catherine of Navarre, the sister of Henry the Great; and perished in the massacre on St. Bartholomew's Day in 1572.

MACROBII, a people of Ethiopia, celebrated for their justice, and the innocence of their manners: also a people in the island Meröe. The Hyperboreans were also called Macrobii: they generally lived to their 120th year; and from their longevity they obtained their name (μακρος βιος, *long life.*)

MACROBIUS (Ambrosius Aurelius Theodosius), an ancient Latin writer, who flourished towards the latter part of the fourth century. Of what country he was, is not clear: Erasmus, in his Ciceronianus, seems to think he was a Greek; and he himself tells us, in the preface to his Saturnalia, that he was not a Roman, but laboured under the inconveniences of writing in a language which was not natural to him. Of what religion he was, Christian or Pagan, is uncertain. Barthius ranks him among the Christians; but Spanheim and Fabricius suppose him to have been a heathen. This however is certain, that he was a man of consular dignity, and one of the chamberlains or masters of the wardrobe to Theodosius; as appears from a rescript directed to Florentius, concerning those who were to obtain that office. He wrote a Commentary upon Cicero's Somnium Scipionis, and seven books of Saturnalia, which treat of various subjects, and are an agreeable mixture of criticism and antiquity. He was not an original writer, but made great use of other people's works, borrowing not only their materials, but even their language; and for this he has been satyrically rallied by some modern authors, though rather unfairly, considering the express declaration and apology which he makes on this head, at the very entrance of his work. "Don't blame me," says he, "if what I have collected from multifarious reading I shall frequently express in the very words of the authors from whom I have taken it: for my view in this present work is, not to give proofs of of my eloquence, but to collect and digest into some regularity and order such things as I thought might be useful to be known. I shall therefore here imitate the bees, who suck the best juices from all sorts of flowers, and afterwards work them up into various forms and orders, with some mixture of their own proper spirit." The Somnium Scipionis and Saturnalia have been often printed; to which has been added, in the latter editions, a piece entitled, "De Differentiis et Societatibus Græci Latinique Verbi."

MACROCEPHALUS (compounded of μακρος, "great," and κεφαλη, "head,"), denotes a person with a head larger or longer than the common size. Macrocephali, or long-heads, is a name given to a certain people, who, according to the accounts of authors, were famous for the unseemly length of their heads: yet custom so far habituated them to it, that, instead of looking on it as a deformity, they esteemed it a beauty; and, as soon as the child was born, moulded and fashioned its head in their hands to as great a length as possible, and afterwards used all such rollers and bandages as might seem most likely to determine its growing long. The greater part of the islanders in the Archipelago, some of the people of Asia, and even some of those of Europe, still press their children's heads out lengthwise.

Macrocephalus, in zoology, a genus of the class insecta; order hemiptera. Snout inflected; the sheath one-valved, three-jointed, and furnished with three bristles; jawless, feelerless, lipless; antennas projecting, very short, submoniliform, clavate; head oblong, cylindrical above; scutel as long as the abdomen, depressed, membranaceous. One species only: M. Cimicoides: a native of North America, less than cimex erosus.

MACROCERCI, a name given to that class of animalcules which have tails longer than their bodies.

MACROCOLUM, or Macrocollum (formed of μακρος, "large," and κολλαω, "I join,") among the Romans, the largest kind of paper then in use. It measured sixteen inches, and frequently two feet.

MACRO'RNEMUM. In botany, a genus of the class pentandria; order monogynia. Corol campanulate; capsule inferior, two-celled; seeds imbricate. Three species: West India trees.

MACROCOSM, a word denoting the great world or universe. It is compounded of the Greek words μακρος, "great," and κοσμος, "world."

MACROLO'BIUM. In botany, a genus of the class triandria; order monogynia. Calyx double, the exterior two-leaved; interior turbinate, obliquely five-toothed; corol five-petalled, the upper very large; legume one-seeded. Three species: trees of Guiana. Mad apple. See *Solanum Lycopersicum.* In botany, a genus of the class syngenesia; order polygamia superflua. Receptacle naked, downless; calyx double; the outer of eight or ten equal leaves; inner many leaves, and shorter than the outer. Three species; natives of Chili.

MACRO'PIPER (*Macropiper, eris,* n. μακροπιπερ; from μακρος, long, and πιπερις, pepper.) See *Piper longum.*

MACROPUS Kangaroo. In zoology, a genus of the class mammalia; order feræ. Fore-teeth, in the upper jaw six, emarginated (in the young or half-grown animal eight), in the lower jaw two, very large, long, sharp, and pointing forwards: grinders five on each side, both in the upper and lower jaw, distant from the upper teeth: fore-legs very short; hind-legs very long: abdominal pouch in the female. Two species.

This genus has hitherto been generally confounded with the dedelphis, in consequence of the arrangement of Gmelin. The teeth, however, are essentially different, as will readily be seen on collating the generic characters; on which account, as well as on several others, Dr. Shaw has separated it

NATURAL HISTORY.

PL. LXXIII.

Drawn from Life by S. Edwards.

*Didelphis Gigantea*, Macropus Major or Kanguroo.

*Dipus Jaculus*, Common Jerboa or Alagtaga.

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from the didelphis tribe; and we have readily adopted the change.

1. M. Major *Great Kangaroo*.—Tail long, thick: hind-feet three times as long as the fore; three-toed: body yellowish grey: head more obtuse than any other species of the genus; ears long; trunk, fore-part slender, hind-part robust; upper lip cleft; nose black at the point; ears thin, oval, erect with short hair; fore-teeth upper, six and broad; lower, two, sharp and moveable; tuskless; grinders four on each side, far back; claws of the fore-feet long, black; middle claw of the hind-feet prominent, exceedingly large. Inhabits Australasia: where it was first discovered by Captain Cook in June 1770: when full grown as large as a sheep; leaps, burrows, eats like a squirrel; feeds on fruit and vegetables; flesh excellent. See *Nat. Hist.* pl. xlv.

Though the general position of the kanguroo when at rest is standing on its hind feet (See the above plate and figure) yet it frequently places its fore-feet on the ground also, and thus feeds in the manner of other quadrupeds. It drinks by lapping. In its natural state it is extremely timid, and springs from the sight of mankind by vast bounds of many feet in height, with great velocity and to a surprising distance. When in a state of captivity, it has sometimes a way of springing forwards and kicking with its hind feet in a very forcible and violent manner: during which action it props itself on the base of its tail. In a natural state it sometimes uses its tail as a weapon of defence; and will give such severe blows with it to dogs as to oblige them to desist from their attack. The female has two breasts in the pouch, with two teats on each; yet she is not known to produce more than one young at a time: and so exceedingly diminutive is the young when first found in the pouch as scarce to exceed an inch in length. By what means it is introduced, there still continues as much an object of inquiry as in the case of the didelphis opossum. The young continues in the pouch till it is grown to a large size. One of the most remarkable peculiarities of this extraordinary creature is its power of separating at pleasure to aconsiderable distance the two long foreteeth in the lower jaw. Yet the mus maritimus does the same. There are probably many varieties of this species; but we are but little acquainted with them at present.

The kanguroo may now be considered as in a considerable degree naturalized in England: several having been kept for some years in the royal domains at Richmond; which have, during their residence there, produced young, and seem to promise to render this most elegant animal a permanent acquisition to our country.

2. M. *Minor Kanguroo Rat*.—Dr. Shaw. Tail long, tapering, hairy: hind-legs long, three-toed; ears rounded: fore-teeth upper eight, two middle one sharper; lower two, long and pointed: grinders three on each side, the foremost channelled; fur smooth, dark-brown. About the size of a rabbit, with the general appearance of a kanguroo, but far less elegant. It inhabits Australasia.

MACTATIO, in the Roman sacrifices, signifies the act of killing the victim. This was performed either by the priest himself, or some of his inferior officers, whom we meet with under the names of *popæ*, *agones*, *cultrarii*, and *victimarii*; but, before the beast was killed, the priest, turning himself to the east, drew a crooked line with his knife, from the forehead to the tail. Among the Greeks, this ceremony was performed most commonly by the priest, or, in his absence, by the most honourable person present. If the sacrifice was offered to the celestial goods, the victim's throat was bent up towards heaven; if to the infernal, or to heroes, it was killed with its throat towards the ground.

MACTRA, in zoology, a genus of the class vermes; order testacea. Animal a tethys: shell bivalve, unequal-sided, equivalve; middle tooth of the hinge complicated, with a small hollow on each side, lateral ones remote, and inserted into each other. Twenty-seven species, inhabiting the coasts of all the quarters of the world; three of them our own coasts. Of different sizes, from that of a man's hand to less than an inch broad: shell as different; smooth, or with wrinkled plates, wedge-shaped, or ovate; diaphanous, pellucid, or semitransparent: striate, banded, white or fawn-colour: some resembling a tellina, others a mya.

MA'CULA. (*Macula*, *æ*. f.) A permanent discolouration of some portion of the skin, often with a change of its texture, but not connected with any disorder of the constitution.

MA'CULA VENE'REA. The venereal eruption.

MACULÆ, in astronomy, dark spots appearing on the luminous faces of the sun, moon, and even some of the planets; in which sense they stand contradistinguished from faculæ. See FACULÆ, ASTRONOMY, and SUN.

*To* MA'CULATE. *v. a.* (*maculo*, Latin.) To stain; to spot.

MACULATION. *s.* (from *maculate*,) Stain; spot; taint (*Shakspeare*).

MA'CULE. *s.* (*macula*, Latin.) A spot; a stain.

MAD. *a.* (ʒemaꝺ, Saxon.) 1. Disordered in the mind; broken in the understanding; distracted (*Taylor*). 2. Expressing disorder of mind (*Milton*). 3. Overrun with any violent or unreasonable desire (*Rymer*). 4. Enraged; furious (*Decay of Piety*).

*To* MAD. *v. a.* To make mad; to make furious; to enrage (*Sidney*).

*To* MAD. *v. n.* To be mad; to be furious (*Milton*).

Mad. *s.* (eaðu, Saxon.) An earthworm (*Ainsworth*).

Mad-*apple*. The oblong egg-shaped fruit of the *Solanum Lycopersicum* of Linnéus. These apples are often boiled in their native places in soups and sauces, in the same manner as love-apple, are accounted very nutritive, and were much sought after by the votaries of Venus, in former days.

MADAGASCAR, a large island of Africa, discovered by the Portuguese, in 1492. It lies 40 leagues east of the continent of Africa, from which it is separated by the strait of Mosambique. It extends 900 miles from north to south, and is from 200 to 300 broad. The inhabitants are divided into a number of tribes, and their number is upwards of four millions. The natives, who are called Malegaches, are commonly tall, well made, of an olive complexion, and some of them pretty black. Their hair is not woolly, like that of the negroes of Guinea; but it is always black, and for the most part curls naturally: their nose is small, though not flat, and they have not thick lips. They have no cities or towns, but a great number of villages a small distance from each other. Their houses are pitiful huts, without windows or chimnies, and the roofs covered with reeds or leaves. Those that are dressed in the best manner have a piece of cotton cloth, or silk, wrapt round their middle; but the common sort have scarce sufficient to hide their nakedness. Both men and women are fond of bracelets and necklaces, and they anoint their bodies with stinking grease or oil. There are a great many petty kings, whose riches consist in cattle and slaves, and they are always at war with each other. It is hard to say what their religion is, for they have neither churches nor priests. They have no rules relating to marriage; for the men and women cohabit together for some time, and then leave each other as freely again. Here are a great number of locusts, crocodiles, cameiions, and other animals common to Africa. The country produces corn and grapes, and several sorts of excellent honey; as also minerals and precious stones. The French have attempted to settle here, but have always been repelled. There are only some parts of the coast yet known. Lat. from 12. to 26. 0. S.

MADAIN, a town of Irac Arabia, on the Tigris, 20 miles south of Bagdad.

MADAN (Martin), an English divine, was born about 1726, of a respectable family, and brought up to the bar, which profession he quitted for the church, though he obtained no preferment. The chapel at the Lock Hospital was built chiefly by his means, and he officiated as the chaplain for many years, without any emolument. He brought upon himself some considerably obloquy for defending the conduct of Dr. Haweis, his assistant, who retained the rectory of Aldwinkle, as was said, contrary to agreement. But he suffered more for publishing a famous book called Thelypthora, or a Treatise on Female Ruin, 3 vols. 8vo. 1781. In this work he maintained the lawfulness, or rather the bounden duty of polygamy, in cases of seduction. Mr. Maden afterwards published a translation of Juvenal and Persius, 2 vols. 8vo. He was a preacher of distinguished talents, and a man of unimpeachable morals. He died in 1790 (*Watkins*).

MA'DAM. *s.* (*ma dame*, French, my dame.) The term of compliment used in address to ladies of every degree (*Spenser*, *Phillips*).

MADARO'SIS. (*Madarosis*, *is*, f. μαδαρωσις, from μαδος, bald, without hair.) A defect or loss of eye-brows, or eyelashes, causing a disagreeable deformity, and painful sensation of the eyes, in a strong light.

MA'DBRAIN. }
MA'DBRAINED. } *a.* (*mad* and *brain.*) Disordered in the mind; hotheaded (*Shakspeare*).

MA'DCAP. *s.* A madman; a wild hotbrained fellow (*Shakspeare*).

*To* MA'DDEN. *v. n.* (from *mad.*) To become mad; to act as mad (*Pope*).

*To* Ma'dden. *v. a.* To make mad (*Thomp.*)

MADDER. In botany. See Rubin.

Madder *Little Field.* See Sherardia.

Madder *Petty.* See Ancianella.

MADDERSTEG (Michael), a Dutch painter, born at Amsterdam, in 1659. He was a disciple of Ludolph Backhuysen, and painted sea-pieces in his manner with great success. He died in 1709 (*Watkins*).

MADDOX (Isaac), an English prelate, was born in London in 1697, and placed out apprentice to a pastry-cook; but his love of learning being perceived, he was educated at Queen's College, Oxford, and entered into orders. In 1729, he was appointed clerk of the closet to Queen Caroline, and in 1733 dean of Wells: in which year he published a Vindication of the Church of England, against Neale's History of the Puritans. In 1736 he was raised to the see of St. Asaph, from whence he was translated to Worcester in 1743. His lordship was a great benefactor to several hospitals, and other public charities, and died in 1759. He published some sermons on public occasions.

MADE. The participle preterit of *make.*

MADEFA'CTION. *s.* (*madefacio*, Latin.) The act of making wet (*Bacon.*)

*To* MA'DEFY. *v. a.* (*madefio*, Latin.) To moisten; to make wet.

MADEIRA, an island in the Atlantic, and the principal of a group, called the Madeiras, about 150 miles in circumference, of a triangular form, so called by the Portuguese, from its being, when they landed on it, covered with wood. The discovery is generally attributed to the Portuguese; but a tradition was formerly held among the natives, that an Englishman, of the name of Macham, who had married a lady of immense fortune, embarked at Bristol, in the year 1342, for France, and was driven by a storm to this island. However, the most probable and best attested account is,

that the Portuguese did not become acquainted with Madeira before the year 1341, when Don Henry first sent a colony thither, under the conduct of Tristan Tessora and Gonzales, or Gonzalvo Zarco, who were nominated governors alternately, or, as others affirm, of different parts of the island. Upon this partition of power, it was divided into two provinces, Machicho and Fonchal: the new colonists immediately set to work in clearing the ground, and, for this purpose, set fire to the forests, which burnt with such violence, that the governor and people were forced to seek protection from the flames in the sea, in which they had almost perished, before they were taken up by a ship. So abundant was the fuel, and fierce the flames, that this fire continued, we are told, for near seven years; in consequence of which, the soil was so enriched by the wood ashes, that, for a long time, it produced one hundred fold; though, we are told, this increase is diminished to twenty-five times the quantities of grain sown, or sugar-canes planted. The climate is more temperate than the Canaries, and the soil more fertile in wine, sugar, and fruits, but less so in corn, though infinitely better watered with springs and rivers, the number of which is infinite. As to cattle, birds, plants, and trees, they are nearly similar, each produces the sanguis draconis, mastick, and other gums. The onions are here so mild, that they are eaten raw like apples. Lemons grow to a large size, and oranges are produced spontaneously, of all sorts and dimensions; besides all the European fruits, peaches, nectarines, melons, apricots, pears, apples, with a variety of others. In Madeira are made the finest sweetmeats in the world, all kinds of fruits being here candied in the most exquisite perfection. In the Madeiras, sugar-works were first erected in the west, of which it had an incredible number, and from thence they were removed to America; soon after which, the Portuguese, finding the demand for their sugars sink, converted their cane plantations into vineyards; which appears to be a better reason, than that of the poverty of the soil. The exports of wines, and the profits on them, are immense, and produce a large revenue to the crown of Portugal. These wines are of different kinds, different both in taste, colour, and strength. Funchal is the capital.

MADELY, a town of England, in Shropshire, formerly a place of trade, but ruined in the civil wars, aud the market discontinued till the year 1763; it has been renewed, but removed a considerable distance from the ancient market-place, to near the iron bridge in Colebrook Dale. The town contains about 100 houses: eight miles north north-west Bridgenorth, and 147 north west London.

MA'DGEHOWLET. *s.* An owl (*Ainsworth*).

MA'DHOUSE. *s.* (*mad* and *house.*) A house where madmen are cured or confined (*L'Estr.*)

MA'DIAN, (anc. geog.) A town of Arabia Petræa, near the Arnan; so called from one of the sons of Abraham by Ketura, in ruins in Jerome's time. Jerome mentions another Madian, or Midian, beyond Arabia in the desert, to the south of the Red Sea: and hence *Madianæi*, and *Madiantæi*, the people; and *Madianæa Regio*, the country.

MA'DLY. *ad.* (from *mad.*) Without understanding; furiously (*Dryden*).

MA'DMAN. *s.* (*mad* and *man.*) A man deprived of his understanding (*South*).

MA'DNESS. *s.* (from *mad.*) 1. Distraction; loss of understanding; perturbation of the faculties (*Locke*). 2. Fury; wildness; rage (*K. Charles*). See MELANCHOLIA, INSANIA, and MANIA.

MADOR, (*Mador, oris*, m.) A sweating. See EPHIDROSIS.

MADRAS, or FORT ST. GEORGE, the principal settlement of the English East India Company, on the east side of the peninsula of Hindoostan, on the coast of Coromandel. It is a fortress of great strength including within it a regular well-built city. It is close on the margin of the bay of Bengal, from which it has a rich and beautiful appearance; the houses being covered with a stucco called chunam, which is nearly as compact as the finest marble, and bears as high a polish. They consist of long colonnades, with open porticos, and flat roofs; and the city contains many handsome and spacious streets. But the inner apartments of the houses are not highly decorated, presenting to the eye only white walls; which, however, from the marble-like appearance of the stucco, give a freshness grateful in so hot a country. Ceilings are very uncommon in the rooms; it being impossible to find any which will resist the ravages of the white ant. These animals are chiefly formidable from the immensity of their numbers, which are such as to destroy, in one night's time, a ceiling of any dimensions, and it is the wood-work which serves for the basis of the ceilings, such as the laths, beams, &c. that these insects attack. "The approach to Madras, from the sea, (says Mr. Hodges) offers to the eye an appearance similar to what we may conceive of a Grecian city in the age of Alexander. The clear, blue, cloudless sky, the polished white buildings, the bright sandy beach, and the dark green sea, present a combination totally new to the eye of an Englishman, just arrived from London, who, accustomed to the sight of rolling masses of clouds floating in a damp atmosphere, cannot but contemplate the difference with delight: and the eye being thus gratified, the mind soon assumes a gay and tranquil habit, analogous to the pleasing objects with which it is surrounded. Some time before the ship arrives at her anchoring ground, she is hailed by the boats of

the country filled with people of business, who come in crowds on board. This is the moment in which an European feels the great distinction between Asia and his own country. The rustling of fine linen, and the general hum of unusual conversation, presents to his mind for a moment the idea of an assembly of females. When he ascends upon the deck, he is struck with the long muslin dresses, and black faces adorned with very large gold ear-rings and white turbans. The first salutation he receives from these strangers is by bending their bodies very low, touching the deck with the back of the hand, and the forehead three times. The natives first seen in India by the European voyager are Hindoos, the original inhabitants of the peninsula. In this part of India they are delicately framed; their hands, in particular, are more like those of tender females; and do not appear to be what is considered a proper proportion to the rest of the person, which is usually above the middle size. Correspondent to this delicacy of appearance, are their manners; mild, tranquil, and seduously attentive; in this last respect they are indeed remarkable, as they never interrupt any person who is speaking, but wait patiently till he has concluded; and then answer with the most perfect respect and composure. From the ship a stranger is conveyed on shore in a boat of the country, called a Massoolah boat; a work of curious construction, and well calculated to elude the violent shocks of the surf, that break here with great violence: they are formed without a keel, flat-bottomed, with the sides raised high, are sewed together with the fibres of the cocoa-nut tree, and caulked with the same material: they are remarkably light, and are managed with great dexterity by the natives; they are usually attended by two kattamarans (rafts) paddled by one man each, the intention of which is, that, should the boat be overset by the violence of the surf, the persons in it may be preserved. The boat is driven, as the sailors say, high and dry; and the passengers are landed on a fine, sandy beach; and immediately enter the fort of Madras. The appearance of the natives is exceedingly varied; some are wholly naked, and others so clothed, that nothing but the face and neck is to be discovered; beside this, the European is struck with many other objects, such as women carried on men's shoulders, on palankeens, and men riding on horseback clothed in linen dresses like women; which, with the very different face of the country from all he had ever seen, or conceived of, excite the strongest emotions of surprise!" There is a second city, called the Black Town, separated from Madras by the breadth of a proper esplanade only; and although near four miles in circuit, fortified in such a manner as to prevent a surprise from the enemy's horse; an evil, to which every town in the Carnatic is subject, from the dryness and evenness of the country. Madras was settled by the English about the year 1640. It was taken by the French in 1746, but restored in 1748. The present fort, which was erected since the destruction of Fort St. David, in 1758, is, perhaps, one of the best fortresses in possession of the British nation. Madras, in common with all the European settlements on this coast, has no port for shipping; the coast forming nearly a straight line; and it is incommoded also with a high and dangerous surf. It is 100 miles north by east of Pondicherry, 758 south-east of Bombay, and 1030 south-west of Calcutta. Lon. 80. 25. E. Lat. 13. 5. N.

MADRE DE DIUS, an island in the S. Pacific Ocean, near the coast of Patagonia, 180 miles in circumference. Lon. 42. 0. W. Lat. 51. 0. S.

MADRE-DE-POPA, a town and convent of S. America, in Terra Firma, seated on the Rio Grande, 20 miles east of Carthagena. It is almost as much resorted to by pilgrims of America, as Loretto is in Europe; and they pretend that the image of the Virgin has done a great many miracles in favour of the seafaring people. Lon. 76. 0. W. Lat. 10. 40. N.

MADREPORA; madrepore: in zoology, a genus of the class vermes, order zoophyta. Animal resembling a medusa; corol with lamellate, star-shaped cavities, a hundred and eighteen species, scattered through the seas of the globe; four common to our own coasts. They may be thus subdivided.

A. Composed of a single star; six species, of which the following may be taken as an example.

1. M. Verrucaria. Star orbicular, flattish, sessile, with a convex disk full of tubular pores, and radiate border. Inhabits the European, Mediterranean and Red Seas, adhering to marine vegetables and softer zoophytes; size of a split pea; and appears an intermediate species between the madripore, tabifore and millefore; white or yellowish, with aggregate tubes on the disk like the florets of a composite flower, and a flattened striate border like the rays of these flowers.

B. With numerous separate stars and continued gills: fourteen species.

2. M. Pileus. Without stem, oblong, convex, beneath concave; with longitudinal rows of concatenate stars; gills crowded, abreviated. Inhabits the Indian Ocean.

C. With numerous united stars: fifteen species.

3. M. Cerebrum. Brain-stone. Nearly globular, with long tortulous undulations and terminating flattish prominent ones. Habitation not known: from two inches to two feet in diameter.

D. Aggregate, undivided, with distinct stars, and porulous tuburculous prominent undulations. Fifty-six species.

E. Branched, with distinct stars, and tuberculous, porulous undulations. Twenty-seven species.

The animal that, in the recent coral, fills these cavities was fish delineated, by Donati in the Philos. Trans. v. xlvii. Its feet are numerous and terminate externally in two conical productions, which being placed on each side of every one of the lamellæ that give the stellular form to the cavity of the coral, serve to affix the animal to the circumference of its cell, and may with propriety be considered as the instruments by which the little animal forms the lamellæ themselves. The bases of these conical productions unite and form round bodies, which possess somewhat of the figure and of the properties of muscles: they undoubtedly serving to lengthen or to shorten the feet, and also most probably to regulate the force with which they clasp the lamellæ, on which they exert their plastic powers. The other ends of these round bodies terminate in small cylindric tubes, which are attached to the shell of the animal, in the centre of which is seen its head, capable of moving with great quickness, and ornamented with several rays, which are most probably the arms or claws with which it seizes and secures the animalcules on which it feeds.

Attributing the formation of these corals to the operations of the madreporean or medusean polype, let us endeavour to trace the little architect through its wonderful labours. Agreeably to the observations of Donati, each of the legs as he terms them, of the polype, is provided with two processes, which are applied to each side of one of the perpendicular laminæ, whilst a muscular pyriform body, attached to the other end of the leg, gives to it the power of employing that motion which is necessary for the accomplishment of its task. The young polype, disposed on an appropriate spot, may be considered as completing its operations by two distinct processes; the secretion and separation of carbonat of lime from the sea-water, conveyed through the pyriform body; and its deposition, at its moment of secretion, by the two small processes, where the economy of the animal directs. Proportioned to the number of legs possessed by the infant animal was probably the number of perpendicular laminæ or pillars converging to the centre, which it began to erect; these, when raised to a certain height, appearing to have been connected together by a horizontal plate of the same substance, on these the animal erected similar pillars, and placed on them a covering similar to that with which he had completed the first compartment. Thus seems to have proceeded the incessant labours of this minute artist: and as the number of its legs or instruments increased, and as they extended in length, so much the number of the perpendicular laminæ, and the circumference of the horizontal plates have also augmented. Thus must this curious fabric have derived its fashion from the growth and form of this minute and wonderful animal.

That the production of turbinated madrepores may have been thus effected it does not seem difficult to conceive. Neither is it difficult to understand that when the animal had attained its full extent of growth, the continuance of its labours would produce, not a body of a conical, but of a cylindrical form. Nor does it seem unlikely that should any accidental circumstance change its horizontal position, a proportional deflection from the straight line would be occasioned, and a coralline body of a curved form be produced. Specimens of both which forms are by no means uncommon.

MADREPORE. See Madreporæ.

MADREPORSTEIN. Madreporite, hairy. Madrepore-stone. In mineralogy a genus of the class earths, order calcareous. Colour greyish-black, or ash-grey; found in rounded masses from twenty to thirty pounds weight: composed of cylindrical, prismatic, distinct concretions parallel or in diverging bundles; fracture radiated, and dull; opake, moderately hard, passing to soft, easily frangible; gives a grey powder dissolves with effervescence in nitric acid, and contains according to M. Shrole

| | |
|---|---|
| Carbinated Lime | 63 |
| Alumine - - - | 10 |
| Silex - - - - | 13 |
| Oxyd of Iron - | 11 |
| | 97 |
| Loss - - - - | 3 |
| | 100 |

Found by Baron Moll in the valley of Rüsback in Saltzburgh in detached masses; has a near resemblance to various lithophytic petrifactions, whence its generic name; but its internal structure wholly different from that of the acknowledged petrifactions of this class.

MADRID, the capital of Spain, in New Castile. It was fomerly an inconsiderable place, belonging to the archbishop of Toledo, but the purity of the air engaged the court to remove hither, and it is now a considerable city. It contains 18 parishes, 35 convents of monks and 31 of nuns, 39 colleges, hospitals, or houses of charity, 15 gates, and about 160,000 inhabitants. The houses are all built with brick, and the streets are long, broad, and straight; and adorned, at proper distances, with handsome fountains. There are above 100 towers or steeples, in different places, which contribute greatly to the embellishment of the city. It stands in a large plain, surrounded by high mountains, but has no wall, rampart, or ditch. The old royal palace being burnt down in 1734, another was erected on a large scale: each front is 470 feet long, and 100 high, so that this immense pile towers over all the country; and no palace in Europe is fitted up

with more royal magnificence. The finest square in Madrid is the Placa Mayor, or Market Place, which is 1536 feet in circuit, surrounded with houses, five stories high, all of an equal height; every story being adorned with a handsome balcony, and the fronts supported by columns, which form very fine arcades. Here they had formerly their famous bull-fights. Casa-del-Campo is a royal house of pleasure, a little above half a mile from Madrid, with very fine gardens, pleasant walks, and a great many uncommon animals. Buen Retiro is another royal palace near the city, and is a proper place to retire to in the heat of the summer, there being a great number of fish-ponds, grottoes, tents, groves, and hermitages. Madrid is seated on the river Manzanares, which, though small, is adorned with two magnificent bridges. It is 265 miles north east of Lisbon, 590 south by west of London, and 625 south south west of Paris. Lon. 3. 20. W. Lat. 40. 25. N.

Madrid, *New*, a city now building, or to be built, in a New Spanish settlement, in Louisiana, on the Mississippi, opposite the mouth of the Ohio. The settlers are to enjoy a free toleration in religion. Lon. 89. 50. W. Lat. 30. 36. N.

MADRI'ER. *s.* A thick plank armed with iron plates, having a cavity sufficient to receive the mouth of the petard when charged, with which it is applied against a gate (*Bailey*).

MA'DRIGAL. *s.* (*madrigal*, Spanish and French.) A pastoral song (*Dryden*).

Madrigal, a town of Spain, in Old Castile, seated in a plain, fertile in excellent wine, 10 miles north-east of Medina-del-Campo. Lon. 4. 19. W. Lat. 41. 25. N.

Madrigal, a town of Terra Firma, in the province of Popayan. Lon. 75. 45. W. Lat. 0. 50. N.

MADRISIO, a town of Italy, in Friuli, lately belonging to the state of Venice, 30 miles north of Venice.

MADROGAM, the capital of Monomotapa, with a spacious royal palace. The upper part of the houses are in the shape of a bell. Lon. 31. 40 E. Lat. 18. 0. S.

MADURA, a town of the Carnatic, capital of a province of the same name, on the coast of Coromandel. It is 130 miles north by east of Cape Comerin, and 300 south-south-west of Madras. Lon. 78. 12. E. Lat. 9. 55. N.

Madura, the capital of an island of the same name, in the Indian Ocean, situate to the north of the east end of the island of Java. Lon. 112. 49. E. Lat. 9. 50. N.

MADWORT. In botany, See Alyssum.

Madwort *German*, See Asperugo.

MÆANDER (anc. geog.) a celebrated river of Asia Minor, rising near Celænæ. It flows through Caria and Ionia into the Ægean sea between Miletus and Priene, after it has been increased by the waters of the Marsyas, Lycus, Eudon, Lethæus, &c. It is celebrated among the poets for its windings, which amount to not less than 600, and from which all the obliquities have received the name of mæanders. It forms in its course, according to the observations of some travellers, the Greek letters ε ζ ξ ς and ω; and from its windings Dædalus is said to have had the first idea of his famous labyrinth.

MÆATÆ, anciently a people of Britain, near Severus's wall, inhabiting the district now called Lauderdale, in Scotland.

MÆCENAS. See Mecœnas.

MAELSTROM, a very dangerous whirlpool on the coast of Norway, in the province of Nordland, and the district of Lofoden, and near the island of Moskoe, from whence it also takes the name of Moskoc-strom. Its violence and roarings exceed that of a cataract, being heard to a great distance, and without any intermission, except a quarter every sixth hour, that is, at the turn of high and low water, when its impetuosity seems at a stand, which short interval is the only time the fishermen can venture in: but this motion soon returns, and however calm the sea may be, gradually increases with such a draught and vortex as absorb whatever comes within their sphere of action, and keep it under water for some hours, when the fragments, shivered by the rocks, appear again. This circumstance, among others, makes strongly against Kircher and others, who imagine that there is here an abyss penetrating the globe, and issuing in some very remote parts, which Kircher is so particular as to assign, for he names the gulph of Bothnia. But after the most exact researches which the circumstances will admit, this is but a conjecture without foundation; for this and three other vortices among the Ferroe islands, but smaller, have no other cause than the collision of waves rising and falling, at the flux and reflux, against a ridge of rocks and shelves, which confine the water so that it precipitates itself like a cataract; and thus the higher the flood rises, the deeper must the fall be; and the natural result of this is a whirlpool or vortex, the prodigious suction whereof is sufficiently known by lesser experiments. But what has been thus absorbed, remains no longer at the bottom than the ebb lasts; for the suction then ceases, and the flood removes all attraction, and permits whatever had been sunk to make its appearance again. When the whirlpool has at any time been agitated by a storm, it has reached vessels to the distance of five or six English miles, when the crews thought themselves to be in perfect security. Lon. 10. 40. E. Greenwich. Lat. 68. 8. N.

MŒMA. In botany a genus of the class polyandria, order monogynia. Calyx four-cleft, with a nectariferous tube; corolless; stigma sessile; drupe doubtful. Two species—natives of Arabia felix.

MÆMACTERION, Μαιμακτηριων, in Chronology, the fourth month of the Athenian

year. It contained twenty-nine days, and answered to the latter part of our September and beginning of October. The Bœotians called it alalcomenius.

It took its name from the festival Memacteria, sacred to Jupiter, kept at this time.

MÆMACYLON, in the Materia Medica, a name given by Dioscorides, and the ancients in general, to the fruit of the arbutus, or strawberry-tree.

MŒNA, in Ichthiology. See SPARUS.

MÆUALUS, in ancient geography, a mountain of Arcadia sacred to the god Pan, and greatly frequented by shepherds.

MÆONIA, or MŒONIA, a country of Asia Minor, and forming part of Lydia; namely, the neighbourhood of mount Tmolus, and the country watered by the Pactolus. The rest on the sea-coast was called Lydia. See LYDIA.

MÆONIDÆ, a name given to the Muses, because Homer, their greatest and worthiest favourite, was supposed to be a native of Mæonia.

MÆONIDES, a surname of Homer, because, according the opinion of some writers, he was born in Mæonia, or because his father's name was Mæon.

MÆOTIS PALUS OR LACUS, *Mœotica Palus*, or *Mœoticus Lasus* (anc. geog.), a large lake or part of the sea between Europe and Asia, at the north of the Euxine, to which it communicates by the Cimmerian Bosphorus. It was worshipped as a deity by the Massagetæ. It extends about 390 miles from south-west to north-east, and is about 600 miles in circumference. Still called Palus Mæotis, reaching from Crim Tartary to the mouth of the Don.

MÆRE. *ad.* It is derived from the Saxon mer, famous, great, noted: so *ælmere* is all famous (*Gibson*).

MAESE or MEUSE, a river which rises in France near the village of Meuse in the department of Upper Marne. It waters Verdun, Stenay, Sedan, Doncherry, Mezieres, and Charleville; and entering the Netherlands at Givet, it flows to Charlemont, Dinant, Namur, Huy, Liege, Mæstricht, Ruremonde, Venlo, Grave, Battenburg, Ravestein, and Voorn, where it is joined by the Wahal.

MAESTOSO, or MAESTUOSO, in the Italian music, signifies to play with grandeur, and consequently slow, but yet with strength and firmness.

MÆSTRICHT, an ancient large and strong town of the Netherlands, ceded to the Dutch by the treaty of Munster. The town-house and the other public buildings are handsome, and the place is about four miles in circumference, and strongly fortified. The inhabitants are noted for making excellent firearms, and some say that in the arsenal there are arms sufficient for a whole army. Both Papists and Protestants are allowed the free exercise of their religion, and the magistrates are composed of both. It is seated on the river Maese, which separates it from Wyck, and with which it communicates by a handsome bridge. Mæstricht revolted from the Spaniards in 1570, but was reduced in 1579. Louis XIV. became master of it in 1673; but it was restored to the States by the treaty of Nimeguen in 1678. Lon. 5. 14. E. Lat. 50. 52. N.

MAFFÆUS (Vegio), a Latin poet, born in Lombardy in 1407, was greatly admired in his time. He wrote epigrams, and a humorous supplement to Virgil, which he called "The thirteenth Book of the Æneid;" this was as humerously translated into English a few years since by Mr. Ellis. Maffæus wrote also some prose works. He was chancellor of Rome towards the end of the pontificate of Martin V. and died in 1458.

MAFFÆUS (Bernardine), a learned cardinal, who died in 1529. He wrote a Commentary on Cicero's Epistles, and a Treatise on Medals and Inscriptions.

MAFFÆUS (John Peter), a learned jesuit, born at Bergamo in 1536, and died at Tivoli in 1603. He wrote a Life of Ignatius Loyola, a History of the Indies, and other works.

MAFFÆUS (Francis Scipio), an Italian marquis. born at Verona in 1675. He served as a volunteer at the battle of Donawert in 1704; but being a greater lover of letters than arms, he soon ended his military career and returned to Italy. He wrote an elaborate treatise against duelling; a tragedy called Merope; a comedy entitled La Ceremonia; and many other esteemed works. He died in 1755.

*To* MA'FFLE. *v. n.* To stammer (*Ainsw.*)

MA'FFLER. *s.* A stammerer (*Ainsworth*).

MAFFRA, a town of Portugal, in Estremadura, near which, in a sandy and barren place, king John V. erected a building of extraordinary magnificence. This was done in pursuance of a vow, made in a dangerous fit of illness, to found a convent for the use of the poorest friary in the kingdom. Upon inquiry, this poorest of convents was found at Maffra, where twelve Franciscans lived together in a hut. The king procured from Rome the design of a building far exceeding the Escurial. It is five miles north-west of Lisbon.

MAGADA, in mythology, a title under which Venus was known and worshipped in Lower Saxony.

MAGADOXO, the capital of a kingdom of the same name, on the coast of Ajan, with a citadel, and a good harbour. The inhabitants are Mahometans. It is seated near the mouth of a river of its own name. Lon. 44. 0. E. Lat. 2. 30. N.

MAGAS, MAGADIS, from μαγαδιζειν, to sing or play in unison or octave, the name of a musical instrument, in use among the ancients.

There were two kinds of magades, the one a string instrument, formed of twenty chords, arranged in pairs, and tuned to uni-

son or octave, so that they yielded ten sounds; the invention whereof is ascribed, by some to Sappho; by others, to the Lydians; and, by some, to Timotheus of Miletus.

The other was a kind of flute, which at the same time, yielded very high and very low notes.

MAGAZINE, a place in which stores are kept, of arms, ammunition, provisions, &c.

*Artillery* MAGAZINE, or the magazine to a field battery, is made about 25 or 30 yards behind the battery, towards the parallels, and at least three feet under ground, to receive the powder, loaded shells, port-fires, &c.—Its roof and sides should be well secured with boards, to prevent the earth from falling in: it has a door, and a double trench or passage sunk from the magazine to the battery, the one to enter and the other to go out at, to prevent confusion. Sometimes traverses are made in the passages, to prevent ricochet shot from entering the magazine.

*Powder* MAGAZINE, is the place where powder is kept in large quantities. Authors differ very much with regard to the situation and construction of these magazines; but all agree, that they ought to be arched and bomb-proof. In fortifications, they were formerly placed in the rampart; but of late they have been built in different parts of the town. The first powder-magazines were made with Gothic arches: but M. Vauban finding these too weak, constructed them of a semicircular form, the dimensions being 60 feet long within, and 25 feet broad; the foundations are eight or nine feet thick, and eight feet high from the foundation to the spring of the arch; also the floor two feet from the ground, to keep it from dampness.

It is a constant observation, that after the centering of semicircular arches is struck, they settle at the crown, and rise up at the hances, even with a straight horizontal extrados; and still much more so in powder-magazines, where the outside at top is formed, like the roof of a house, by inclined planes joining in an angle over the top of the arch, to give a proper descent to the rain; which effects are exactly what might be expected from the true theory of arches. Now, this shrinking of the arches, as it must be attended with very bad consequences, by breaking the texture of the cement after it has in some degree been dried, and also by opening the joints of the vousoirs at one end, so a remedy is provided for this inconvenience, with regard to bridges, by the arch of equilibration, in Dr. Hutton's Principles of Bridges; but as the ill consequences of it are much greater in powder-magazines, in question 96 of the Doctor's Mathematical Miscellany, he proposed to find an arch of equilibration for them also; which question was there resolved both by Mr. Wildbore and himself, upon general principles, and illustrated by an application to a particular case, which is there constructed, and accompanied with a table of numbers for that purpose. Thus, if ALKMB (fig. 13. pl. 99.) represent a vertical transverse section of the arch, the roof forming an angle LKM of 112° 37′, also PC an ordinate parallel to the horizon taken in any part, and IC perpendicular to the same; then for properly constructing the curve so as to be the strongest, or an arch of equilibration in all its parts, the corresponding values of PC and CI will be as in the following table, where those numbers may denote any lengths whatever, either inches, or feet, or half-yards.

| Value of PC | Value of CI |
|---|---|
| 1 | 7·031 |
| 2 | 7·125 |
| 3 | 7·264 |
| 4 | 7·501 |
| 5 | 7·789 |
| 6 | 8·164 |
| 7 | 8·574 |
| 8 | 9·078 |
| 9 | 9·663 |
| 10 | 10·333 |

MAGAZINE, or *Powder-Room*, on shipboard, is a close room or store-house, built in the fore or after part of the hold, in which to preserve the gunpowder for the use of the ship. This apartment is strongly secured against fire, and no person is allowed to enter it with a lamp or candle. It is therefore lighted, as occasion requires, by means of the candles or lamps in the light-room contiguous to it.

MAGAZINE *Air-Gun*. See AIR-*Gun*.

MAGAZINES (*Literary*), a well known species of periodical publications, of which the first that appeared was The Gentleman's, set on foot by the inventor Mr. Edward Cave, in the year 1731. This, as Dr. Kippis observes (Biog. Brit. vol. iii. art. CAVE), "may be considered as something of an epocha in the literary history of this country. The periodical performances before that time were almost wholly confined to political transactions, and to foreign and domestic occurrences; but the monthly magazines have opened a way for every kind of inquiry and information. The intelligence and discussion contained in them are very extensive and various; and they have been the means of diffusing a general habit of reading through the nation, which in a certain degree hath enlarged the public understanding. Many young authors, who have afterwards risen to a considerable eminence in the literary world, have here made their first attempts in composition. Here two are preserved a multitude of curious and useful hints, observations and facts, which otherwise might have never appeared; or, if they had

appeared in a more evanescent form, would have incurred the danger of being lost. If it were not an invidious task, the history of them would be no incurious or unentertaining subject. The magazines that unite utility with entertainment are undoubtedly preferable to those (if there have been any such) which have only a view to idle and frivolous amusement. It may be observed, that two of them, "The Gentleman's" and "The London," which last was begun the year after the former, have, amidst their numerous rivals, preserved their reputation to the present day. They have both of them, in general, joined instruction with pleasure; and this likewise hath been the case with some others of a later origin." The original London Magazine, it is believed, has been discontinued for some years past. The next oldest publication of this kind is that entitled "The Scots Magazine;" which was commenced at Edinburgh a few years posterior to the appearance of "The Gentleman's at London; which, like it, has survived many rivals; and which still subsists, deservedly esteemed for the chasteness of its plan, and the accuracy of its information.

The principal magazines and reviews now published, with the estimate number of each, are as below:

| | |
|---|---|
| Evangelical Magazine | 25,000 |
| Methodist Magazine | 30,000 |
| Edinburgh Review (quarterly) | 13,000 |
| Quarterly Review | 6,000 |
| Monthly Magazine | 5,000 |
| Baptist Magazine | 5,000 |
| Monthly Review | 4,250 |
| Gentleman's Magazine | 3,500 |
| European Magazine | 3,500 |
| Lady's Magazine | 3,000 |
| Literary Panorama | 2,500 |
| Universal Magazine | 2,000 |
| Tradesman, or Commercial Magazine | 2000 |
| British Critic | 2,000 |
| Philosophical Magazine | 2,000 |
| Critical Review | 1750 |
| Repertory of Arts, &c. | 1,500 |
| Eclectic Review | 1,500 |
| Journal of Voyages | 1,500 |
| Christian Observer | 1,250 |
| Monthly Mirror | 1,000 |
| Nicholson's Journal | 1,000 |
| Antijacobin Review | 1900 |

MAGDALEN'S Cave, a cave of Germany, in Carinthia, ten miles east of Goritz. It is divided into several apartments, with a vast number of pillars formed by nature, which give it a beautiful appearance, they being as white as snow, and almost transparent. The bottom is of the same substance.

MAGDALENA, a river of Louisiana, which rises in the mountains that separate Louisiana from New Mexico, and falls into the Pacific Ocean, to the south-west of the bay of St. Lewis.

MAGDEBURG, a duchy of Germany, in the circle of Lower Saxony, bounded on the north by the old marche of Brandenburg, on the east by the middle marche, on the south by Anhalt and Halberstadt, and on the west by Brunswick. The parts which are not marshy and overgrown with wood, are very fertile. It is 60 miles in length and breadth, and belongs to the king of Prussia.

Magdeburg, a city of Germany, and capital of a principality of the same name, in the circle of Lower Saxony, on the Elbe It is the seat of the provincial regency, the consistory, the war and demesne office, and one of the principal trading towns in all Germany. It is likewise a very strong fortification, having, among other works, a citadel, seated on an island in the river Elbe. Magdeburg is well built, but the principal beauty of the town consists in its cathedral square, which is ornamented with large elegant houses, and the area of it well paved. Among the most remarkable public edifices here, are the king's palace, which was anciently the residence of the bishops, and in which are held the war and demesne office, with the armory, the governor's house, and the guild hall, where the regency and consistory are held. The Lutheran cathedral here, dedicated to St. Maurice, is a superb structure, in the antique taste. The Lutherans are possessed of three collegiate, and six parochial churches here, and a convent. The manufactures are numerous; woollen cloths and stuffs, silk stuffs, cottons, linen, stockings, hats, beautiful leathern gloves, black and yellow tobacco, roll tobacco, snuff, &c. Its situation on the Elbe, and the road here betwixt High and Low Germany, is very advantageous to its trade. Magdeburg, so early as the time of Charles the Great, was no inconsiderable place. Lat. 52. 16. N. Lon. 12. 9. E.

MAGELLAN (Ferdinand), a celebrated Portuguese mariner in the sixteenth century. Being dissatisfied with the king of Portugal, he went into the service of the emperor Charles V. and sailed from Seville with five vessels in 1519, when he discovered and passed the strait to which he gave his own name, and sailed through the South Sea to the Ladrone Islands, when, according to some authors, he was poisoned in 1520; though others say that he was killed in a mutiny of his people in the island of Mutan, on account of his severity. His voyage round the world was written by one on board, and has been frequently printed in English. His suddenly converting to the Christian religion people whose language was unknown to him, as his was to them, is an absurdity that discredits this work.

Magellan (*Straits of*), a narrow passage between the island of Terra del Fuego and the southern extremity of the continent of America. This passage was first discovered by Ferdinand Magellan, who sailed through it into the South Sea, and from thence to the East Indies. Other navigators have passed the same way: but as these straits are exceedingly difficult, and subject to storms, it has been common to sail by Cape Horn, rather than through the Straits of

Magellan. See Straits le Maire, and Terra del Fuego.

MAGELLANIC-Clouds, whitish appearances like clouds, seen in the heavens towards the south pole, and having the same apparent motion as the stars. They are three in number, two of them near each other. The largest lies far from the south pole; but the other two are not many degrees more remote from it than the nearest conspicuous star, that is, about eleven degrees. Mr. Boyle conjectures, that if these clouds were seen through a good telescope, they would appear to be multitudes of small stars, like the milky-way.

MAGELLANICUS Cortex. See Winteranus Cortex.

MAGGIUS (Jerome), a learned Italian of the sixteenth century, was a native of Tuscany, and had a genius for almost every kind of learning. The Venetians employed him as judge-martial at the Isle of Cyprus, where he performed so much service, when it was besieged by the Turks, that, on the island being taken, he experienced the most cruel treatment. He was carried to Constantinople, where he beguiled the horrors of slavery by writing a treatise on bells, De Tintinuabulis, and another on the wooden horse, De Equuleo. The bashaw Mahomet caused him to be strangled about the year 1573. He wrote several books before he went to Cyprus.

MAGGOT. *s.* A small kind of worm; being a fly in one of its states. See Musca.

Maggot, denotes figuratively a whimsey, a caprice, an odd fancy.

MAGGOTTINESS. *s.* The state of having, abounding in maggots.

MAGGOTTY. *a.* Full of maggots. Figuratively, it signifies whimsical, capricious, fantastical, fanciful.

MAGGOT-Fishing, or fishing with gentles, begins with May and continues till Christmas: but the best time for taking grayling with them in rivers, is from the middle of August till November. Maggots are constantly of use in fishing; for all sorts of fresh-water fishes (except salmon, pike, and shad) will feed upon this bait in a very plentiful manner. It is the best bait for quickness of sport; for upon throwing in a few handfulls, by little and little, before you begin to fish, you will draw the prey together, and they will pick up the baits from the bottom, just as poultry will pick up their food from the ground.

It was formerly the practice to bait the hook with the maggot, and to bait the holes with other sort of ground baits, which could afford but little sport; for neither trout, grayling, nor perch will eat grains, stewed malt, pastes, or any such inanimate baits, and therefore it is necessary to bait the hole with the same you put upon your hook; living baits, when thrown into the water, being much more tempting than dead ones, and making the fish more eager. If you lose a hook in a grayling's mouth there great probability that in five minutes you recover it, by using more caution the next time you strike; for when the fishes are come in shoals to your baiting place, the largest fish presses most forward, and soonest catches your bait.

When you fish in rivers with this bait, your line should be finer than for pool-fishing, and leaded pretty heavy; the lower link should be a single hair, or a fine silkworm gut; and your shot should drag upon the bottom, especially in a stream. See Angling.

MAGI, or Magians, an ancient religious sect in Persia, and other eastern countries, who maintained that there were two principles, one the cause of all good, the other the cause of all evil: and, abominating the adoration of images, they worshipped God only by fire; which they looked upon as the brightest and most glorious symbol of Orosmades, or the good God; as darkness is the truest symbol of Arimanius, or the evil god. This religion was reformed by Zoroaster, who maintained that there was one supreme independent being; and under him two principles or angels, one the angel of goodness and light, and the other of evil and darkness: that there is a perpetual struggle between them, which shall last to the end of the world; that then the angel of darkness and his disciples shall go into a world of their own, where they shall be punished in everlasting darkness! and the angel of light and his disciples shall also go into a world of their own, where they shall bere warded in everlasting light. The priests of the magi were the most skilful mathematicians and philosophers of the ages in which they lived, insomuch that a learned man and a magian became equivalent terms. The vulgar looked on their knowledge as supernatural; and hence those who practised wicked and mischievous arts, taking upon themselves the name of magians, drew on it that ill signification which the word magician now bears among us. This sect still subsists in Persia, under the denomination of Gaurs, where they watch the sacred fire with the greatest care, and never suffer it to be extinguished.

MAGIC, Magia, Μαγεια, in its ancient sense, the science or discipline and doctrine of the magi, or wise men of Persia. See Magi. The origin of magic and the magi is ascribed to Zoroaster. Salmasius derives the very name from Zoroaster, who, he says, was surnamed Mog, whence Magus. Others, instead of making him the author of the Persian philosophy, make him only the restorer and improver thereof; alleging, that many of the Persian rites in use among the magi were borrowed from the Zabii among the Chaldeans, who agreed in many things with the magi of the Persians; whence some make the name magus common both to the Chaldeans aed Persians. Thus Plutarch

mentions, that Zoroaster instituted magi among the Chaldeans, in imitation whereof the Persians had theirs too.

Magic, in a more modern sense, is a science which teaches to perform wonderful and surprising effects. The word magic originally carried with it a very innocent, nay, laudable meaning; being used purely to signify the study of wisdom, and the more sublime parts of knowledge; but in regard the ancient magi engaged themselves in astrology, divination, sorcery, &c. the term magic in time became odious, and was only used to signify an unlawful and diabolical kind of science, depending on the assistance of the devil and departed souls.

If any wonder how so vain and deceitful a science should gain so much credit and authority over men's minds, Pliny gives the reason of it. It is, says he, because it has possessed itself of three sciences of the most esteem among men; taking from each all that is great and marvellous in it. Nobody doubts but it had its first origin in medicine, and that it insinuated itself into the minds of the people, under pretence of affording extraordinary remedies. To these fine promises it added every thing in religion that is pompous and splendid, and that appears calculated to blind and captivate mankind. Lastly, it mingled judicial astrology with the rest; persuading people, curious of futurity, that it saw every thing to come in the heavens. Aggrippa divides magic into three kinds; natural, celestial, and ceremonial or superstitious.

*Natural* Magic is no more than the application of natural active causes to passive subjects; by means whereof many surprising, but yet natural, effects are produced. In this way many of our experiments in natural philosophy, especially those of electricity, optics, and magnetism, have a kind of magical appearance, and among the ignorant and credulous might easily pass for miracles. Such, without doubt, have been some of those miracles wrought by ancient magicians, whose knowledge of the various powers of nature, there is reason to believe, was much greater than modern vanity will sometimes allow. Baptista Porta has a treatise of natural magic, or of secrets for performing very extraordinary things by natural causes. The natural magic of the Chaldeans was nothing but the knowledge of the powers of simples and minerals. The magic which they called theurgia consisted wholly in the knowledge of the ceremonies to be observed in the worship of the gods, in order to be acceptable. By virtue of these ceremonies they believed they could converse with spiritual beings, and cure diseases.

*Celestial* Magic, borders nearly on judiciary astrology: it attributes to spirits a kind of rule or dominion over the planets, and to planets a dominion over men; and on those principles builds a ridiculous kind of system. See Astrology.

*Superstitious* or *Goetic* Magic, consists in the invocation of devils. This species of magic, there is every reason to believe, had its origin in Egypt, the native country of paganism. The first magicians mentioned in history were the Egyptians; and that people so famed for early wisdom believed not only the existence of dæmons, the great agents in magic (see Dæmon), but also that different orders of those spirits presided over the elements of earth, air, fire, and water, as well as over the persons and affairs of men. Hence they ascribed every disease with which they were afflicted to the immediate agency of some evil dæmon. When any person was seized with a fever, for instance, they did not think it necessary to search for any natural cause of the disease; it was immediately attributed to some dæmon which had taken possession of the body of the patient, and which could not be ejected but by charms and incantations.

These superstitious notions, which had spread from Egypt over all the East, the Jews imbibed during their captivity in Babylon. Hence we find them in the writings of the New Testament attributing almost every disease to which they were incident to the immediate agency of devils (see Possession.) Many of the same impious superstitions were brought from Egypt and Chaldea by Pythagoras, and transmitted by him and his followers to the Platonists in Greece. This is apparent from the writers of the life of Pythagoras, Jamblichus, speaking of the followers of that philosopher, says expressly, that they cured certain diseases by incantations; and Porphyry adds, that they cured diseases both of the mind and of the body by songs and incantations. This was exactly the practice of the Egyptian priests, who were all supposed to keep up a constant intercourse with dæmons, and to have the power of controlling them by magical charms and sacred songs. Agreeably to this practice of his masters, we are told that Pythagoras directed certain diseases of the mind, doubtless those which he attributed to the agency of demons, to be cured partly by incantations, partly by magical hymns, and partly by music—και τας ψυχας δε νοσουντας παρεμυθειτο τους μεν επωδαις και μαγειαις τους δε μουσικη.

The revival of learning, and the success with which the laws of nature have been investigated, have long ago banished this species of magic from all the enlightened nations of Europe. Among ourselves, none but persons grossly illiterate pay the least regard to magical charms; nor are they any where abroad more prevalent than among the inhabitants of Lapland and Iceland. These people, indeed, place an absolute confidence in the effects of certain idle words and actions; and ignorant sailors

from other parts of the world are deceived by their assertions and their ceremonies. The famous magical drum of the Laplanders is still in constant use in that nation; and Scheffer, in his History of Lapland, has given an account of its structure.

This instrument is made of beech, pine, or fir, split in the middle, and hollowed on the flat side where the drum is to be made. The hollow is of an oval figure, and is covered with a skin clean dressed, and painted with figures of various kinds, such as stars, suns and moons, animals and plants, even countries, lakes, and rivers; and of later days, since the preaching of Christianity among them, the acts and sufferings of our Saviour and his apostles are often added among the rest. All these figures are separated by lines into three regions or clusters.

There is, besides these parts of the drum, an index and a hammer. The index is a bundle of brass or iron rings, the biggest of which has a hole in its middle, and the smaller ones are hung to it. The hammer or drumstick is made of the horn of a rein-deer; and with this they beat the drum so as to make these rings move, they being laid on the top for that purpose. In the motion of these rings about the pictures figured on the drum, they fancy to themselves some prediction in regard to the things they inquire about.

What they principally inquire into by this instrument, are three things. 1. What sacrifices will prove most acceptable to their gods. 2. What success they shall have in their several occupations, as hunting, fishing, curing of diseases, and the like; and 3. What is doing in places remote from them. On these several occasions they use several peculiar ceremonies, and place themselves in various odd postures as they beat the drum; which influences the rings to the one or the other side, and to come nearer to the one or the other set of figures, And when they have done this, they have a method of calculating a discovery, which they keep as a great secret, but which seems merely the business of the imagination in the diviner or magician.

Magic Square, a small figure, formed of a series of numbers in mathematical proportion; so disposed in parallel and equal ranks, as that the sums of each row, taken either perpendicularly, horizontally, or diagonally, are equal.

Let the several numbers which compose any square number (for instance, 1, 2, 3, 4, 5, &c. to 25 inclusive, the square number) be disposed, in their natural order, after each other in a square figure of 25 cells, each in its cell; if now you change the order of these numbers, and dispose them in the cells in such manner as that the five numbers which fill an horizontal rank of cells, being added together, shall make the same sum with the five numbers in any other rank of cells, whether horizontal or vertical, and even the same number with the five in each of the two diagonal ranks; this disposition of numbers is called a magic square, in opposition to the former disposition, which is called a natural square. See the figures following:

Natural Square.

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 |

Magic Square.

| | | | | |
|---|---|---|---|---|
| 16 | 14 | 8 | 2 | 25 |
| 3 | 22 | 20 | 11 | 9 |
| 15 | 6 | 4 | 23 | 17 |
| 24 | 18 | 12 | 10 | 1 |
| 7 | 5 | 21 | 19 | 13 |

One would imagine that these magic squares had that name given them in regard to this property of all their ranks, which, taken any way, make always the same sum, appeared extremely surprising, especially in certain ignorant ages, when mathematics passed for magic; but there is a great deal of reason to suspect, that these squares merited their name still farther by the superstitious operations they were employed in, as the construction of talismans, &c. for, according to the childish philosophy of those days, which attributed virtues to numbers, what virtues might not be expected from numbers so wonderful?

However, what was at first the vain practice of makers of talismans and conjurers, has since become the subject of a serious research among mathematicians; not that they imagine it will lead them to any thing of solid use or advantage. Magic squares savour too much of their original to be of much use, but only as it is a kind of play, where the difficulty makes the merit, and it may chance to produce some new views of numbers, which mathematicians will not lose the occasion of.

Eman Moschopulus, a Greek author of no great antiquity, is the first that appears to have spoken of magic squares: and by the age wherein he lived, there is reason to imagine he did not look on them merely as a mathematician. However, he has left us some rules for their construction. In the treatise of Cor. Agrippa, so much accused of magic, we find the squares of seven numbers, viz. from three to nine inclusive, disposed magically; and it must not be supposed that those seven numbers were preferred to all the other without some very good reason: in effect, it is because their squares, according to the system of Agrippa and his followers, are planetary. The square of 3, for instance, belongs to Saturn; that of 4 to Jupiter; that of 5 to Mars; that of 6 to the Sun; that of 7 to Venus: that of 8 to Mercury; that of 9 to the Moon. M. Bachet applied himself to the study of magic squares, on the hint he had taken from the planetary squares of Agrippa, as being unacquainted with the work of Moschopulus, which is only in manuscript in the French king's library; and, without the assistance or any author, he found out a new method for those squares whose root is uneven, for instance 25, 49, &c. but he could not make any thing of those whose root is even.

After him came M. Frenicle, who took the same subject in hand. A certain great Algebraist was of opinion, that whereas the 16 numbers which compose the square might be disposed 20922789888000 different ways in a natural square (as from the rules of combination it is certain they may), they could not be disposed in a magic square above 16 different ways; but

M. Frenicle showed, that they might be thus disposed 878 different ways: whence it appears how much his method exceeds the former, which only yielded the 55th part of magic squares of that of M. Frenicle.

To this inquiry he thought fit to add a difficulty that had not yet been considered: the magic square of 7, for instance, being constructed, and its 49 cells filled, if the two horizontal ranks of cells, and, at the same time, the two vertical ones, the most remote from the middle, be retrenched; that is, if the whole border or circumference of the square be taken away, there will remain a square whose root will be 5, and which will only consist of 25 cells. Now it is not at all surprising that the square should be no longer magical, because the ranks of the large ones were not intended to make the same sum, excepting when taken entire with all the seven numbers that fill their seven cells; so that being mutilated each of two cells, and having lost two of their numbers, it may be well expected that their remainders will not any longer make the same sum. But M. Frenicle would not be satisfied, unless when the circumference or border of the magic square was taken away, and even any circumference at pleasure, or, in fine, several circumferences at once, the remaining square was still magical: which last condition, no doubt, made these squares vastly more magical than ever.

Again, he inverted that condition, and required that any circumference taken at pleasure, or even several circumferences, should be inseparable from the square; that is, that it should cease to be magical when they were removed, and yet continue magical after the removal of any of the rest. M. Frenicle, however, gives no general demonstration of his methods, and frequently seems to have no other guide but chance. It is true his book was not published by himself, nor did it appear till after his death, viz. in 1693.

In 1703, M. Poignard, canon of Brussels, published a treatise of sublime magic squares. Before him there had been no magic squares made but for serieses of natural numbers that formed a square; but M. Poignard made two very considerable improvements. 1. Instead of taking all the numbers that fill a square, for instance the 36 successive numbers, which would fill all the cells of a natural square, whose side is 6, he only takes as many successive numbers as there are units in the side of the square, which, in this case, are six; and these six numbers alone he disposes in such manner in the 36 cells that none of them are repeated twice in the same rank, whether it be horizontal, vertical, or diagonal; whence it follows, that all the ranks, taken all the ways possible, must always make the same sum, which M. Poignard calls repeated progression. 2. Instead of being confined to take these numbers according to the series and succession of the natural numbers, that is, in an arithmetical progression, he takes them likewise in a geometrical progression, and even in an harmonical progression. But with these two last progressions the magic must necessarily be different to what it was: in the squares filled with numbers in geometrical progression, it consists in this, that the products of all the ranks are equal; and in the harmonical progression, the numbers of all the ranks continually follow that progression: he makes squares of each of these three progressions repeated.

This book of M. Poignard gave occasion to M. de la Hire to turn his thoughts the same way, which he did with such success, that he seems to have well nigh completed the theory of magic squares. He first considers uneven squares: all his predecessors on the subject having found the construction of even ones by much the most difficult; for which reason M. de la Hire reserves those for the last. This excess of difficulty may arise partly from hence, that the numbers are taken in arithmetical progression. Now in that progression, if the number of terms be uneven, that in the middle has some properties which may be of service; for instance, being multiplied by the number of terms in the progression, the product is equal to the sum of all the terms.

M. de la Hire proposes a general method for uneven squares, which has some similitude with the theory of compound motions, so useful and fertile in mechanics. As that consists in decompounding motions, and resolving them into others more simple; so does M. de la Hire's method consist in resolving the square that is to be constructed into two simple and primitive squares. It must be owned, however, it is not quite so easy to conceive those two simple and primitive squares in the compound or perfect square, as in an oblique motion to imagine a parallel and perpendicular one.

Suppose a square of cells, whose root is uneven, for instance 7; and that its 49 cells are to be filled magically with numbers, for instance the first 7. M. de la Hire, on the one side, takes the first 7 numbers, beginning with unity, and ending with the root 7; and on the other 7, and all its multiples to 49, exclusively; and as these only make six numbers, he adds 0, which makes this an arithmetical progression of 7 terms as well as the other; 0. 7. 14. 21. 28. 35. 42. This done, with the first progression repeated, he fills the square of the root 7 magically: in order to this, he writes in the first 7 cells of the first horizontal rank the seven numbers proposed in what order he pleases, for that is absolutely indifferent; and it is proper to observe here, that those seven numbers may be ranged in 5040 different manners in the same rank. The order in which they are placed in the first horizontal rank, be it what it will, is that which determines their order in all the rest. For the second horizontal rank, he places in its first cell, either the third, the fourth, the fifth, or the sixth number, from the first number of the first rank; and after that writes the six others in order as they follow. For the third horizontal rank, he observes the same method with regard to the second that he observed in the second with regard to the first, and so of the rest. For instance, suppose the first horizontal rank filled with the seven numbers in their natural order, 1, 2, 3, 4, 5, 6, 7; the second horizontal rank may either commence with 3, with 4, with 5, or with 6: but in this instance it commences with three; the third rank

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3 | 4 | 5 | 6 | 7 | 1 | 2 |
| 5 | 6 | 7 | 1 | 2 | 3 | 4 |
| 7 | 1 | 2 | 3 | 4 | 5 | 6 |
| 2 | 3 | 4 | 5 | 6 | 7 | 1 |
| 4 | 5 | 6 | 7 | 1 | 2 | 3 |
| 6 | 7 | 1 | 2 | 3 | 4 | 5 |

therefore must commence with 5, the fourth with 7, the fifth with 2, the sixth with 4, and the seventh with 6. The commencement of the ranks which follow the first being thus determined, the other numbers, as we have already observed, must be written down in the order wherein they stand in the first, going on to 5, 6, and 7, and returning to 1, 2, &c. till every number in the first rank be found in every rank underneath, according to the order arbitrarily pitched upon at first. By this means it is evident, that no number whatever can be repeated twice in the same rank; and by consequence, that the seven numbers 1, 2, 3, 4, 5, 6, 7, being in each rank, must of necessity make the same sum.

It appears, from this example, that the arrangement of the numbers in the first rank being chosen at pleasure, the other ranks may be continued in four different manners: and since the first rank may have 5040 different arrangements, there are no less than 20160 different manners of constructing the magic square of seven numbers repeated.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2 | 3 | 4 | 5 | 6 | 7 | 1 |
| 3 | 7 | 5 | 6 | 7 | 1 | 2 |
| 4 | 6 | 6 | 7 | 1 | 2 | 3 |
| 5 | 5 | 7 | 1 | 2 | 3 | 4 |
| 6 | 4 | 1 | 2 | 3 | 4 | 5 |
| 7 | 3 | 2 | 3 | 4 | 5 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7 | 1 | 2 | 3 | 4 | 5 | 6 |
| 6 | 7 | 1 | 2 | 3 | 4 | 5 |
| 5 | 6 | 7 | 1 | 2 | 3 | 4 |
| 4 | 5 | 6 | 7 | 1 | 2 | 3 |
| 3 | 4 | 5 | 6 | 7 | 1 | 2 |
| 2 | 3 | 4 | 5 | 6 | 7 | 1 |

The order of the numbers in the first rank being determined; if in beginning with the second rank, the second number 2, or the last number 7, should be pitched upon, in one of those cases and repeated; and in the other case, the other diagonal would be false unless the number repeated seven times should happen to be 4; for four times seven is equal to the sum of 1, 2, 3, 4, 5, 6, 7: and in general, in every square consisting of an unequal number of terms, in arithmetical progression, one of the diagonals would be false according to those two constructions, unless the term always repeated in that diagonal were the middle term of the progression. It is not, however, at all necessary to take the terms in an arithmetical progression; for, according to this method, one may construct a magic square of any numbers at pleasure, whether they be according to any certain progression or not. If they be in an arithmetical progression, it will be proper, out of the general method, to except those two constructions which produce a continual repetition of the same term in one of the two diagonals, and only to take in the case wherein that repetition would prevent the diagonal from being just; which case being absolutely disregarded when we computed that the square of 7 might have 20,160 different constructions, it is evident that by taking that case in it must have vastly more.

To begin the second rank with any other number besides the second and the last, must not, however, be looked on as an universal rule: it holds good for the square of 7; but if the square of 9, for instance, were to be constructed, and the fourth figure of the first horizontal rank were pitched on for the first of the second, the consequence would be, that the fifth and eighth horizontal ranks would likewise commence with the same number, which would therefore be repeated three times in the same vertical rank, and occasion other repetitions in all the rest. The genera rule, therefore, must be conceived thus: let the number in the first rank pitched on, for the commencement of the second, have such an exponent of its quota; that is, let the order of its place be such, as that if an unit be taken from it, the remainder will not be any just quota part of the root of the square; that is, cannot divide it equally. If, for example, in the square of 7, the third number of the first horizontal rank be pitched on for the first of the second, such construction will be just; because, the exponent of the place of that number, viz. 3, subtracting 1, that is, 2, cannot divide 7. Thus also might the fourth number of the same first rank be chosen, because 4—1, viz. 3, cannot divide 7; and, for the same reason, the fifth or sixth number might be taken: but in the square of 9, the fourth number of the first rank must not be taken, because 4---1, viz. 3, does divide 9. The reason of this rule will appear very evidently, by considering in what manner the returns of the same numbers do or do not happen, taking them always in the same manner in any given series. And hence it follows, that the fewer divisions the root of any square to be constructed has, the more different manners of constructing it there are; and that the prime numbers, i. e. those which have no divisions, as 5, 7, 11, 13, &c. are those whose squares will admit of the most variations in proportion to their quantities.

These squares constructed according to this method have some particular properties not required in the problem; for the numbers that compose any rank parallel to one of the two diagonals, are ranged in the same order with the numbers that compose the diagonal to which they are parallel. And as any rank parallel to a diagonal must necessarily be shorter, and have fewer cells than the diagonal itself, by adding to it the correspondent parallel, which has the number of cells by which the other falls short of the diagonal, the number of those two parallels,

First Primitive.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3 | 4 | 5 | 6 | 7 | 1 | 2 |
| 5 | 6 | 7 | 1 | 2 | 3 | 4 |
| 7 | 1 | 2 | 3 | 4 | 5 | 6 |
| 2 | 3 | 4 | 5 | 6 | 7 | 1 |
| 4 | 5 | 6 | 7 | 1 | 2 | 3 |
| 6 | 2 | 1 | 2 | 3 | 4 | 5 |

placed as it were end to end, still follow the same order with those of the diagonal: besides that their sums are likewise equal; so that they are magical on another account. Instead of the squares, which we have hitherto formed by horizontal ranks, one might also form them by vertical ones; the case is the same in both.

All we have hitherto said regards only the first primitive square, whose numbers, in the proposed example, were 1, 2, 3, 4, 4, 5, 6, 7; here still remains the second primitive, whose numbers are 0, 7, 14, 21, 28, 35, 42. M. de la Hire proceeds in the same manner here as in the former; and this may likewise be constructed in 20160 different manners, as containing the same number of terms with the first.

Second Primitive.

| | | | | | | |
|---|---|---|---|---|---|---|
| 0 | 7 | 14 | 21 | 28 | 35 | 42 |
| 21 | 28 | 35 | 42 | 0 | 7 | 14 |
| 42 | 0 | 7 | 14 | 21 | 28 | 35 |
| 14 | 21 | 28 | 35 | 42 | 0 | 7 |
| 35 | 42 | 0 | 7 | 14 | 21 | 28 |
| 7 | 14 | 21 | 28 | 35 | 42 | 0 |
| 28 | 35 | 42 | 0 | 7 | 14 | 21 |

Its construction being made, and of consequence all its ranks making the same sum, it is evident, that if we bring the two into one, by adding together the numbers of the two corresponding cells of the two squares, that is, the two numbers of the first of each, the two numbers of the second, of the third, &c. and dispose them in the 49 corresponding cells of a third square, it will likewise be magical in regard to its rank, formed by the addition of equal sums to equal sums, which must of necessity be equal among themselves. All that remains in doubt is, whether or no, by the addition of the corresponding cells of the two first squares, all the cells of the third will be filled in such manner as that each not only contains one of the numbers of the progression from 1 to 49, but also that this number be different from any of the rest, which is the end and design of the whole operation.

As to this, it must be observed, that if in the construction of the second primitive square care has been taken, in the commencement of the second horizontal rank, to observe an order with regard to the first different from what was observed in the construction of the first square; for instance, if the second rank of the first square began with the third term of the first rank, and the second rank of the second square commence with the fourth of the first rank, as in the example it actually does; each number of the first square may be combined once, and only once, by addition with all the numbers of the second.

Perfect Square.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 9 | 17 | 25 | 33 | 41 | 49 |
| 24 | 32 | 40 | 48 | 7 | 8 | 16 |
| 47 | 6 | 14 | 15 | 23 | 31 | 39 |
| 21 | 22 | 41 | 38 | 46 | 25 | 13 |
| 37 | 47 | 4 | 12 | 20 | 28 | 29 |
| 11 | 19 | 27 | 35 | 36 | 46 | 3 |
| 34 | 42 | 43 | 2 | 10 | 18 | 26 |

And as the numbers of the first are here 1, 2, 3. 4, 5, 6, 7, and those of the second, 0, 7, 14, 21, 28, 35, 42, by combining them in this manner we have all the numbers in the progression from 1 to 49, without having any of them repeated; which is the perfect magic square proposed.

The necessity of constructing the two primitive squares in a different manner, does not at all hinder but that each of the 20,160 constructions of the one may be combined with all the 20,160 constructions of the other: of consequence, therefore, 20,160 multiplied by itself, which makes 406,425,600, is the number of different constructions that may be made of the perfect square, which here consists of the 49 numbers of the natural progression. But as we have already observed, that a primitive square of seven numbers repeated may have above 20,160 several constructions, the number 406,425,600 must come vastly short of expressing all the possible constructions of a perfect magic square of the 49 first numbers.

As to the even squares, he constructs them like the uneven ones, by two primitive squares; but the construction of primitives is different in general, and may be so a great number of ways: and those general differences admit of a great number of particular variations, which give as many different constructions of the same even square. It scarce seems possible to determine exactly, either how many general differences there may be between the construction of the primitive squares of an even square and an uneven one, nor how many particular variations each general difference may admit of; and, of consequence, we are still far from being able to determine the number of different constructions of all those that may be made by the primitive squares.

The reader who has a taste for such speculations may consult Despiace's Amusements, and Dr. Hutton's translation of Montucle's Recreations.

MA'GIC *Lantern*. See LANTERN.

MA'GIC. *a.* 1. Enchanted; necromantic (*Shakspeare*). 2. Done or produced by magic (*Milton*).

MAGICIAN, one who practices magic, or hath the power of doing wonderful feats by the agency of spirits. Among the eastern nations it seems to have been formerly common for the princes to have magicians about their court to confer with him upon extraordinary occasions.

MAGISTE'RIAL. *a.* (from *magister*, Lat.). 1. Such as suits a master (*K. Charles*). 2. Lofty; arrogant; proud; insolent; despotic (*South*). 3. Chemically prepared, after the manner of a magistery (*Grew*).

MAGISTE'RIALLY. *ad.* Arrogantly; with an air of authority (*South*).

MAGISTE'RIALNESS. *s.* (from *magisterial.*) Haughtiness; airs of a master (*Gov, of Ton.*)

MAGISTERY, an old chemical term, very nearly synonymous with precipate, but is now rarely used except in the following combinations: magistery of bismuth, which is the white oxyd of this metal precipated from the nitrous solution by the addition of water, magistery of sulphur, which is

sulphur precipated from its alkaline solution by an acid.

MA'GISTRACY. *s.* (*magistratus*, Latin.) Office or dignity of a magistrate (*Ben Johnson*).

MA'GISTRALLY. *ad.* (*magistralis*, low Latin.) Despotically; authoratively; magisterially (*Bramhall*).

MA'GISTRATE. *s.* (*magistratus*, Latin.) A man publicly invested with authority; a governour (*Decay of Piety*).

MAGLIABECHI (Anthony), a learned Florentine, born in 1663. He was apprenticed to a goldsmith, but the love of learning was so strong that he soon abandoned that profession, and applied to study with such intenseness, as to be deemed a prodigy. He had an astonishing memory, a remarkable instance of which is related in his life. A gentleman, to make trial of this faculty, lent him a manuscript he was going to print. Some time after it was returned, the author came to him and pretended it was lost. Magliabechi, being requested to recollect what he remembered of it, wrote the whole, without missing a word, or varying the spelling. Cosmo III. grand duke of Florence, made him his librarian, but he still preserved his accustomed manners. An old cloak served him for a gown in the day, and for bedclothes at night. He had one straw chair for his table, and another for his bed, in which he continued fixed among his books till he was overpowered by sleep. He was a great friend to learned men, and took much pleasure in assisting them with his advice and information. He died at the age of 81, having led a very temperate life. He published no works of his own, but greatly contributed to the labours of others.

MAGLIANO, a small but populous town of Italy, in the territory of the pope, and district of Sabina, seated on a mountain, near the river Tiber, 30 miles south-west of Spoletto, and 30 north of Rome. Lon. 12. 35. E. Lat. 42. 25. N.

MAGMA (μαγμα.) The dregs residuum, or caput mortuum. After the process of infusion or distillation.

MAGNA ASSISA ELIGENDA, is a writ anciently directed to the sheriff for summoning four lawful knights before the justices of assize, in order to choose twelve knights of the neighbourhood, &c. to pass upon the great assize between such a person plaintiff and such a one defendant.

MAGNA CHARTA. See CHARTA and LIBERTY.

MAGNA'LITY. *s.* (*magnalia*, Latin.) A great thing; something above the common rate (*Br.*)

MAGNANI'MITY. *s.* (*magnanimité*, Fr. *magnanimus*, Latin.) Greatness of mind; bravery; elevation of soul (*Spenser, Swift*).

MAGNA'NIMOUS. *a.* (*magnanimus*, Lat.) Great of mind; elevated in sentiment; brave (*Grew*).

MAGNA'NIMOUSLY. *ad.* Bravely; with greatness of mind (*Milton*).

MAGNA'VACCA, a town of Italy, in the Ferrarese, with a fort, seated at the mouth of the lake of Comachio, in the gulph of Venice, 12 miles north of Ravenna. Lon. 12. 4. E. Lat. 44. 52. N.

MAGNESIA. Manganese. Black Magnesia. In mineralogy, a genus of the class metals, a dark grey, gradually blackening by exposure to the air, hard, very brittle, of a granular texture, attracted by the magnet when reduced to powder, specific gravity 7,000: melting with difficulty, its black oxyd assuming a green colour, which in a very violent heat is fused and converted into a green glass, or when fused with borax into a deep red glass; when dissolved in sulphuric acid, leaving a black spongy mass behind, and forming a red precipitate, with the addition of soda. Nine species.

1. M. Regulina. Native metallic, manganese, (*Schmeisser.*) Staining the fingers, of a silver-grey colour with metallic lustre, and divergingly foliated texture.

Found in the valley of Viedoseos, near Lem, in the Pyrennees, in kidney-form masses.

2. M. Ochracea. Ochra magnesia Linn. Magnesia friabilis Cronst. Indurated earthy ochre. Kirw. Found in England, Pyrennees, mines of Franconia, and the Altaic mountains of Siberia, massive or disseminated, cellular, porous, perforated or in various imitative forms; texture earthy; colour blackish; spec. grav. before it has absorbed water 3,707, after absorption 3,903.

3. M. Pictorum. Black, friable, floating, mixed dry with a fourth of its weight of linseed oil, producing spontaneous inflammation, found in Derbyshire; contains manganese, oxyd of iron, lead and mica.

4. M. Nivea. White calx of manganese. (*Kirwan*). White ore of manganese (*Bergman*). Carbonat of manganese (*Thomson*). White, becoming brownish, or blackish when heated, soft, effervescing with nitric acid, and emitting sulphurated hydrogen gas. Found in the mines of Great Britain, Norway, Sweden, and Transylvania; in round or kidney-form masses, sometimes in loose scales.

5. M. Rubra. Red, colouring glasses red. Found near Piedmont and Lem on the Pyrenees in round lumps or fibrous in a stellate manner.

6. M. Vulgaris. Ferrum fuscum. *Linn.* Molybdænum *Syst. Nat.* Magnesia fuliginosa (*Wall*). Black and brown ore (*Berkenh*). Grey ore of manganese (*Kirw*). Grey oxyd of mang. (*Thom. Schmeisser.*) Soft, staining the fingers, of a steel-grey colour with metallic lustre. Found in various parts of Gt. Britain, Sweden, France, Germany, Bohemia, massive, disseminated, or imitative, colour greyish-white, more or less dusky, with

sometimes a small tinge of red: used for colouring glass, as an ingredient in printer's ink, and for yielding oxygen gass; nearly two quarts of this gas may be obtained from an ounce of the oxyd. It contains from 30 to 40 per cent. of oxyd of manganese, from 30 to 40 of oxygen, and a small quantity of oxyd of iron, carbonat of lime, barytes, and silica.

7. M. Nigra. Magnesia, scoriacea (*Cronst.*) (*Wall*). Black or brown manganese (*Kirw.*) Black calciform manganese (*Shemeisser*). Black ore of manganese (*Thomson*). Soft, staining the fingers, black with hardly any lustre. Found commonly in the mines containing the grey ore, massive, investing, or variously imitative; colour black or dark brown: in its composition it resembles the last, but contains more iron.

8. M. Petracrius. Magnesia compacta, (*Wall*). Perigord-stone (*Kirw*). Hardish, staining the fingers, blackish, shining internally, becoming red when heated. Found at Perigord in France.

9. M. Rosea. Red ore of manganese, (*Kirw*). Reddish-white oxydated manganese, (*Schmeisser*). Found in the Nagyag mines of Transylvania, where it is the matrix of gold, and near Kapnik in Hungary, massive, loose, disseminated, or imitative magnesia native. *Naturliche talkende*, Wern. Pure magnesian earth, consisting as follows:

| | |
|---|---|
| Magnesia - - | 47 . 4 |
| Carbonic acid | 51 . |
| A trael of iron | - . |
| | 98 . 4 |

It has hitherto been found only at Raubschük in Moravia, where it occurs in turpentine accompanied by meerschaum.

MAGNE'SIA, (*Magnesia, æ.* Fr. from *magnes*, a loadstone). The substance which is thus called in the scientific chemical nomenclature is pure magnesian earth, and not the magnesia of the shops. It is given as an absorbent, antacid, and eccoprotic, in cardialgia, spasms, convulsions, and tormina of the bowels of infants; pyrosis, flatulencies, and other diseases of the primæ viæ; obstipation, leucorrhœa, rickets, scrofula, crusta lactea, and podagra. See MAGNESIA ALBA.

MAGNE'SIA ALBA, (*Magnesia, æ.* from *magnes*, a loadstone, or whatever else possesses a power of attraction.) The ancient alchemists gave this name to such substances as they conceived to have the power of attracting any principle from the air. Thus an earth, which from being exposed to the air, increased in weight, and yielded vitriol, they called *magnesia vitriolata*: and later chemists, observing in their process, that a nitrous acid was separated, and an earth left behind, supposing it had attracted the acid, called it *magnesia nitri*, which from its colour soon obtained the name of *magnesi alba*. The magnesia alba of the pharmacopoeias is a carbonate of magnesia, and is usually obtained from Epsom salt. It is in form of very fine powder, considerably resembling flour in its appearance and feel; it has no sensible taste on the tongue; it gives a faint greenish colour to the tincture of violets, and converts turnsole to a blue. It is employed medicinally as an absorbent, antacid, and purgative.

MAGNE'SIA CALCINATA. See MAGNESIA USTA.

MAGNE'SIA USTA. *Magnesia calcinata. Magnesia pura.* Burnt magnesia. This preparation is the pure megnesian earth, and, therefore, termed *magnesia* simply in the new chemical nomenclature. It is antacid and eccoprotic, and may be given with advantage in cardialgia, spasms, convulsions, and gripes of infants, flatulencies, and other disorders of the primæ viæ. It is likewise recommended in the cure of leucorrhœa, rickets, scrofula, crusta lactea, and podagra.

MAGNE'SIA VITRIOLATA. *Sal catharticus amarus*, *Sal Epsomensis.* This very common purging salt is obtained in great abundance from the Epsom water in Surry. It is a sulphat of magnesia, and, therefore, called sulphas magnesiæ in the new chemical nomenclature. It is mostly given as a cathartic in feculence of the primæ viæ, constipation, &c. Its nauseous state is completely overcome by rubbing two or three bitter almonds to an ounce, and mixing them. Vitriolated magnesia is also employed to obtain magnesia.

Epsom salts or sulphat of magnesia may also be obtained in very large quantities from the mother brine or bitter liquor remaining after the crystallization, of muriat of soda, or common salt from sea-water. The mother brine remaining in the pits at Lymington, gives the largest quantity and is worked with the greatest success during the winter season, when the manufacture of salt is suspended in consequence of the want of a requisite temperature for the spontaneous evaporation of the sea-water. See SODA, Muriat of; and SEA-SALT.

The process is a very simple one; and we shall copy its description from Dr. Henry's "Analysis of several varieties of British and Foreign Salt," inserted in the Philosophical Transactions for 1810, Part I. p. 94. "The bitter liquor from the pits is boiled for some hours in the pans which are used in summer to prepare common salt; and the impurities which rise to the surface, are removed by skimming. During the evaporation a portion of common salt separates; and this, as it is too impure for use, is reserved for the purpose of concentrating the brine in summer. The evaporated bitter liquor is then removed into wooden coolers eight feet long, five feet wide, and one foot deep. In these it remains 24 hours, during which time, if the weather prove clear and cold, the sulphat of magnesia or Epsom salt, chrystallizes at the bottom of the coolers in

quantity equal to about one-eighth of the boiled liquor. The uncrystallizable fluid is then let off through plug-holes at the bottom of the coolers, and the Epsom salt after being drained in baskets, is deposited in the store-house. This is termed *single* Epsom salts; and after solution and a second crystallization, it acquires the name of *double* Epsom salts. Four or five tons of sulphat of magnesia are produced from a quantity of brine that has yielded 100 tons of common salt, and one ton of cut-salt"—or that which crystallizes around the fixed upright stakes that support the troughs with holes at the bottom into which the salt is put after exposure to evaporation by fire, and through which holes, the surplus water or bitter brine drops into the pits below.

Magnesia, (anc. geog.) a maritime district of Thessaly, lying between the south part of the Sinus Thermaicus and the Pegasaeus to the south, and to the east of the Pelasgiotis. *Magnetes*, the people. *Magnesius* and *Magnessus*, the epithet (*Horace*).

Magnesia, a town of Asia Minor on the Mæander, about 15 miles from Ephesus. Themistocles died there: it was one of the three towns given him by Artaxerxes, with these words, "to furnish his table with bread." It is also celebrated for a battle which was fought there, 190 years before the Christian era, between the Romans and Antiochus king of Syria. The forces of Antiochus amounted to 70,000 men according to Appian, or 70,000 foot and 12,000 horse according to Livy, which has been exaggerated by Florus to 300,000 men; the Roman army consisted of about 28 or 30,000 men, 2000 of which were employed in guarding the camp. The Syrians lost 50,000 foot and 4000 horse; and the Romans only 300 killed, with 25 horse. It was founded by a colony from Magnesia in Thessaly; and was commonly called *Magnesia ad Mæandrum*, to distinguish it from another called *Magnesia ad Sipylum* in Lydia, at the foot of mount Lipylus.

MAGNESIATA, in mineralogy, a genus of the class earths, order calcareous. Consisting of carbonat of lime, a little black oxyd of manganese, carbonic acid gass, and water; hardish, lamellar, spontaneously separating into grains; gradually changing the colour of its surface when exposed to the air effervescing slowly with acids, and often not without nituration; becoming black in the fire. Three species.

1. M Granularis. Sidero-calcite (*Kirw.*) Brown span (*Schmeisser*). Subopake, tranquil in the fire, breaking into indeterminate fragments of a common form. Found in various parts of Germany, Sweden, France, in large masses; colour flesh, white, rose, greyish, yellowish, and reddish-white, with frequently an insidescent metallic appearance: spec. grav. 2,837, containing

| | |
|---|---|
| Carbonat of lime | 50. |
| Oxyd of iron | 22. |
| ——— manganese | 28. |
| | 100 |

2. M. Flexuosa. Shining internally, making a grey mark, breaking into indeterminate fragments, with the foliations incurved. Found in Sweden, reddish or greyish-white.

3. M. Spatosa. A little shining internally, making a grey mark, breaking into rhomboidal fragments, with the foliations straight.

α of a common form.

β Kidney-shaped.

γ Crystallized; the crystals often very small, sometimes scattered, sometimes clustered in a series, lenticular, rhombic or six-sided-pyramidal.

Found in the mines of Hercynia and Saxony, diaphous, subopake, rarely opake; colour cinereous, reddish, or yellowish-white, isabella, rosy, flesh-colour, or reddish-brown, often several intermixed, with a metallic lustre; differs from ferrum spatosum by the smaller proportion of iron and oxyd of manganese, it contains manganese.

The first mine of manganese was discovered in England by Boyle. A few experiments were made upon this mineral by Glauber in the year 1656, and by Waitz in 1705; but chemists in general seem to have paid but very little attention to it. The greater number of mineralogists, though much puzzled what to make of it, agreed in placing it among iron ores: but Pott, who published the first chemical examination of this mineral in 1740, having ascertained that it often contains scarcely any iron. Cronstedt, in his System of Mineralogy, which appeared in 1758, assigned it a place of its own, on the supposition that it consisted chiefly of a peculiar earth. Rinman examined it anew in 1765; and in the year 1770 Kaim published at Vienna a set of experiments, in order to prove that a peculiar metal might be extracted from it. The same idea had struck Bergman about the same time, and induced him to request of Scheele, in 1771, to undertake an examination of manganese. Scheele's dissertation on it, which appeared in 1774, is a masterpiece of analysis, and contains some of the most important discoveries of modern chemistry. Bergman himself published a dissertation on it the same year; in which he demonstrates that the mineral, then called manganese, is a metallic oxyd. He accordingly made several attempts to reduce it, but without success; the whole mass either assuming the form of scoriæ, or yielding only small separate globules attracted by the magnet. This difficulty of fusion led him to suspect that the metal he was in quest of bore a strong analogy to platinum. In the mean time Dr. Gahn, who was making experiments on the same mi-

neral, actually succeeded in reducing it by the following process: he lined a crucible with charcoal-powder moistened with water, put into it some of the mineral formed into a ball by means of oil, then filled up the crucible with charcoal-powder, luted another crucible over it, and exposed the whole for about an hour to a very intense heat. At the bottom of the crucible was found a metallic button, or rather a number of small metallic globules, equal in weight to one-third of the mineral employed. It is easy to see by what means this reduction was accomplished. The charcoal attracted the oxygen from the oxyd, and the metal remained behind. The metal obtained, which is called manganese, was farther examined by Ilseman in 1782, Hielm in 1785, and Bindheim in 1789.

I. Manganese, when pure, is of a greyish-white colour, and has a good deal of brilliancy. Its texture is granular. It has neithee taste nor smell. Its hardness is equal to that of iron. Its specific gravity is 7.000. It is very brittle; of course it can neither be hammered, nor drawn out into wire. Its tenacity is unknown. It requires, according to Morveau, the temperature of 160° Wedgewood to melt it; so that, platinum excepted, it is the most infusible of all the metals. When reduced to powder it is attracted by the magnet, owing probably to a small portion of iron from which it can with difficulty be parted.

II. Manganese, when exposed to the air, attracts oxygen more rapidly than any other body, phosphorus excepted. It loses its lustre almost instantly, becomes grey, violet, brown, and at last black. These changes take place still more rapidly if the metal is heated in an open vessel.

This metal seems capable of combining with three different proportions of oxygen, and of forming three different oxyds, the white, the red, and the black.

The protoxyd or white oxyd, may be obtained by dissolving the black oxyd of manganese in nitric acid, by adding a little sugar. The sugar attracts oxygen from the black oxyd, and converts it into the white, which is dissolved by the acid. Into the solution pour a quantity of potass; the protoxyd precipitates in the form of a white powder. It is composed, according to Bergman, of 80 parts of manganese and 20 of oxygen. When exposed to the air it soon attracts oxygen, and is converted into the black oxyd.

The deutoxyd or red oxyd, may be obtained by dissolving the black oxyd in sulphuric acid, without the addition of any combustible substance. When black oxyd of manganese, made into a paste with sulphuric acid. is heated in a retort, a great quantity of oxygen gass comes over, while the oxyd, thus deprived of part of its oxygen, dissolves in the acid. Distil to dryness, and pour water upon the residuum, and pass it through a filtre. A red-coloured solution is obtained, consisting of the sulphat of manganese dissolved in water. On the addition of an alkali a red substance precipitates, which is the red oxyd of manganese. According to Bergman it is composed of 74 parts of manganese and 26 of oxygen. This oxyd likewise attracts oxygen when exposed to the atmosphere, and is converted into the black oxyd.

The peroxyd of black oxyd of manganese exists abundantly in nature; indeed it is almost always in this state that manganese is found. It was to the black oxyd that the appellation manganese itself was originally applied. It may be formed very soon by exposing the metal to the air. This oxyd, according to Fourcroy, is composed of 60 parts of manganese and 40 of oxygen. When heated to redness in an earthen retort it gives out abundance of oxgen gass, which may be collected in proper vessels. By this operation it is reduced nearly to the state of red oxyd. It is exposed to the air, and moistened occasionally, it absorbs a new dose of oxygen; and thus the same process may again be repeated. No oxygen gas can be obtained from the white oxyd: a proof that its oxygen is retained by a stronger affinity than the additional dose of oxygen which constitutes the black oxyd. Seguin has observed, that in some cases the black oxyd of manganese emits, before it becomes red, a quantity of azotic gas. When long exposed to a strong heat it assumes a green colour. In that state it is whitened by sulphuric acid, but not dissolved. A very violent heat fuses this oxyd, and converts it into a green-coloured glass.

III. Manganese does not combine with hydrogen. When dissolved in sulphuric acid a black spongy mass of carburet of iron is left behind. Hence it has been supposed capable of combining with carbon; but it is more probable that the carbon is combined with the iron, which is almost always present in manganese. It seems pretty clear, however, that carburet of iron is capable of combining with this metal, and that it always forms a part of steel.

Bergman did not succeed in his attempt to combine manganese with sulphur; but he formed a sulphureted oxyd of manganese, by combining eight parts of the black oxyd with three parts of sulphur. It is of a green colour, and gives out sulphureted hydrogen gas when acted upon by acids. It cannot be doubted, however, that sulphur is capable of combining with manganese; for Proust has found native sulphuret of manganese in that ore of tellurium which is known by the name of gold ore of Nagyag.

Phosphorus may be combined with manganese by melting together equal parts of the metal and of phosphoric glass; or by dropping phosphorus upon red-hot manga-

nese. The phosphuret of manganese is of a white colour, brittle, granulated, disposed to crystallize, not altered by exposure to the air, and more fusible than manganese. When heated the phosphorus burns, and the metal is oxydized.

IV. Manganese does not combine with either of the simple combustibles.

V. Manganese combines with many of the metals, and forms with them alloys which have been but very imperfectly examined.

It unites readily with copper. The compound, according to Bergman, is very malleable; its colour is red, and it sometimes becomes green by age. Gmelin made a number of experiments to see whether this alloy could be formed by fusing the black oxyd of manganese along with copper. He partly succeeded, and proposed to substitute this alloy instead of the alloy of copper and arsenic, which is used in the arts.

It combines readily with iron; indeed it has scarcely ever been found quite free from some mixture of that metal. Manganese gives iron a white colour, and renders it brittle. It combines also with tin, but scarcely with zinc.

It does not combine with mercury nor with bismuth. Gmelin found that manganese cannot be alloyed with bismuth without great difficulty; and that it unites to antimony very imperfectly. Chemists have not attempted to combine it with gold, platinum, silver, nickel, nor cobalt.

VI. The affinities of manganese, and of its white and red oxyds, are, according to Bergman, as follows:

| *Manganese* | *Oxyd of manganese.* |
|---|---|
| Copper, | Oxalic acid, |
| Iron, | Citric, |
| Gold, | Phosphoric, |
| Silver, | Tartaric, |
| Tin. | Fluoric, |
| | Muriatic, |
| | Sulphuric, |
| | Nitric, |
| | Saclactic, |
| | Succinic, |
| | Tartaric, |
| | Lactic, |
| | Acetic, |
| | Prussic, |
| | Carbonic. |

*Reduction of ores.* As manganese is applied to no use in its metallic state, there are no establishment for the reduction of its ores in the great way: and even in the laboratory the process is seldom performed, chiefly on account of the intense heat which is requisite, and which cannot be obtained in small furnaces, unless they are peculiarly well constructed. The use of all alkaline and vitreous fluxes must be carefully avoided: for the affinity of these with the oxyd of manganese is so considerable, as entirely to prevent its reduction when they are present. The only method that has been attended with any tolerable success, is the following invented by Bergman. Select a sound and very refractory crucible, and line it with charcoal, or still better, with a mixture of linseed-meal and water, beaten up with as much finely-sifted charcoal as it will take without losing its tenacity; dry the crucible thoroughly, gradually increasing the heat till the meal begins to be scorched: then take some oxyd of manganese purified from all extraneous substances, and make it up into a ball with any kind of oil; put this into the cavity of the crucible and cover it with powdered charcoal: then lute in a pierced cover or an inverted crucible, and place it in a blast furnace: keep it a moderate red heat till the jet of blue flame through the hole in the cover has ceased: then bring the furnace rapidly to its highest heat, and keep it so for about three quarters of an hour: then let the fire go out, and when the crucible is quite cold break it up carefully, and the manganese will be found in globules of various sizes, covered for the most part with a thin vitreous crust.

MAGNET, or loadstone, in mineralogy. See Ferrum *magnes*.

MAGNE'TICAL. } *a.* (from *magnet.*) 1.
MAGNE'TIC. } Relating to the magnet (*Newton*). 2. Having powers correspondent to those of the magnet (*Newton*). 3. Attractive; having the power to draw things distant (*Donne*).

Magnetic *Iron-stone.* See Ferrum.

Magnetic *Sand.* See Ferrum.

Magnetic *Needle.* See Needle and Compass.

MAGNETISM, the power by which the loadstone is influenced, and manifesting itself by certain phenomena of attraction and repulsion. Or, it is the science in which phenomena of this kind are classified and reduced to laws.

The loadstone was long regarded as a simple stone possessing the property of attracting iron, as the name given, in the common language of every country, to the ferruginous mine endowed with this quality, will shew; such as pierre d'aimant, for example, in French, and the loadstone in English. Men judged of its substance by the stony particles that are often mixed with it, but which are purely accidental.

1. The attractive virtue of the loadstone was known to the ancients, and they had even remarked, that it communicated to one piece of iron the power of attracting another piece. But though, from the sympathy it seemed to evince for iron, the loadstone became one of those sports in which curiosity delights, and which it repaid in various ways, the best and most important property of this mineral, which occasions one of its extremities to have a northern and the other a southern direction, long escaped observation. This discovery was made about the twelfth century, and several nations claim the honour of it.

2. The earliest theories of magnetism partook of the systematic ideas that prevailed among the philosophers of the day. The vortices of Descartes captivated the mind to such a degree, that

attempts were made to introduce them every where. They were given to electric bodies, and the magnet also must have its share. Afterwards the idea suggested itself of simple effluvia of magnetic matter, the moleculæ of which advanced towards each other, or took a retrograde motion, according to the manner in which the respective effluvia of two magnets met. There were supposed to be in the iron a kind of small hairs that performed the office of valves, to aid the passage of the fluid in one way, and to oppose its passage when it presented itself in a contrary direction. Such was, among others, the opinion of Dufay; and this philosopher, who had seen so clearly the principle of electric motion, when he came to apply it to magnetism, presented a machine of his own invention, instead of the mechanism of nature.

3. Æpinus was the first, who, to explain the phenomena of magnetism, made use of simple powers subjected to calculation. The idea which served as the basis of his theory was suggested to him while holding a tourmalin in his hand. He had discovered, that the effects of this stone were the result of electricity, and had remarked, that it repelled on one side, and attracted on the other, a small electrised body. To these two sides he gave the name of poles, and this appellation, which might have passed for a convenient mode of expression only, became the word really expressive of the thing. He saw in the tourmalin a kind of small electric magnet, and comparing the phenomena of real magnets with those of idio-electric bodies, he found, that the action of the two fluids might be reduced to the same laws; and thus added to the merit of having improved the theory of electricity, and created, as it were, the theory of magnetism, that of combining in the same link these two grand portions of the chain of human science.

Coulomb, receiving from the hands of Æpinus the first of these theories to give it a new modification, thereby contracted a sort of engagement to improve the second also; and it will presently be seen, from the sketch we shall give of his results, with what fidelity he has acquitted himself.

*I. General Principles of the Theory of Magnetism.*

4. Though the magnetic fluid is governed by the same laws as the electric fluid, there are several things, in the present state of our knowledge, that indicate a difference between them. Iron and one or two other metallic substances, are the only bodies that have hitherto exhibited unequivocal signs of magnetism, whereas all bodies are susceptible of the electric virtue. If an electrised tourmalin be presented to a magnetised needle freely suspended, whatever may be the direction of the two bodies as to the poles, the tourmalin exercises on the needle, to alter its position, the same attractive force only that it would exercise on any other body; which implies, that its presence gives rise in the needle itself to an electric virtue independent of the magnetic virtue.

5. The correspondence between the two theories leads us further to consider the magnetic fluid as composed of two distinct fluids, combined together in iron that exhibits no sign of magnetism, and existing apart in that which has undergone a state of magnetism. The moleculæ of each fluid also repel one another, and attract those of the other fluid; and Coulomb has proved, as we shall presently see, that these different actions follow the inverse ratio of the square of the distance.

6. All the natural fluid of the magnetic body, even after its decomposition, remains in the interior of that body; and, in this view, magnets may be assimilated to idio-electric bodies. The two fluids disengaged from the state of combination, take contrary movements towards the extremities of the magnet, and thus exhibit actions analogous to those of vitreous and resinous electricity.

But, before we proceed further, let us take a general view of magnetism as it presents itself in all its extent; for to understand well the development of the theory, it is necessary to have at least an idea of it as a whole.

7. All the phenomena that magnets which have been subjected to experiment have furnished, are only so many different aspects, as it were, of a fundamental fact, that has long been remarked. It consists in this, that if we take at pleasure one of the extremities of a magnet, and apply it to the two extremities of another magnet, there will be attraction on one part and repulsion on the other between the two magnets. The opposed extremity of the first magnet will produce on those of the other magnet inverse effects. In general there is in every magnet two opposite points, that exhibit contrary actions and to which the name of poles has been given. We may judge of the energy of these contrary influences, by making a magnet act in presence of a magnetised needle freely suspended; the extremities of this needle will make different circuits, and sometimes a complete revolution, to find the position required by the equilibrium.

8. Now we have a phenomenon, extremely remarkable by its continuity and the immense distances to which it extends itself, in the terrestrial globe, which performs, relatively to a magnetised needle, the same function as the magnet in the instance we have just mentioned: so that the needle, left to the influence of this vast magnetic body, takes a direction from north to south, and which we see to be that which accords with the manner of acting of this same governing influence. For if, when the needle is at rest, we alter its position, it never fails, after a few oscillations, to return to it again. What would have been the sentiments of the ancient philosophers, who already ascribed a soul to magnets, though they knew nothing of their powers of action but in circumstances of contact, had the idea occurred to them of suspending one of these bodies to a thread?

9. What we have remarked in the preceding paragraph, leads to an observation that we conceive to be interesting, relative to the manner of denominating the two fluids which compose the magnetic fluid, as well as the poles in which their powers of action reside. The mere mention of the hypothesis relative to the existence of these fluids is sufficient to enable us to understand that the magnetic repulsions, similar in this respect to electric repulsions, are ascribable to those which exist between homogeneous fluids, and the attractions to those which heterogeneous fluids exert on one another. It follows from this, that when a magnetised needle is in its natural direction, the pole of that needle, which is turned to the north, is in the opposite state to that of the pole of our globe, which is in the same quarter; and as this last-mentioned pole ought to be the true north pole relative to magnetism,

as it is with respect to the four cardinal points, it would seem more appropriate to give the name of south-pole to the extremity of the needle that is turned towards the north, and that of north pole to the opposite extremity. We shall therefore adopt these denominations, which are already employed in England, and by a necessary consequence, shall call by the name of austral fluid that which the part of the needle nearest to the north solicits, and the name of boreal fluid that which resides in the part situated towards the south.

10. We have seen that it is with magnetism, as it would be with electricity, if there existed in nature no other than perfectly idio-electric bodies. No magnet ever possesses more than its natural quantity of fluid, which is constant; so that it can derive no additional portion from any extraneous body nor communicate the smallest portion of what it possesses by nature; and the change to a state of magnetism depends solely on the disengagement of the two fluids which constitute the natural fluid, and their passage to opposite parts of the iron.

11. The harder this metal is, the greater is the difficulty which the *two* fluids experience in moving in its pores; and, generally speaking, this difficulty is always considerable, and much superior to the resistance which bodies even the most perfectly idio-electric oppose to the internal motion of fluids disengaged from their natural fluid. Coulomb has given to this power the name of coercive force, as he has to that which acts in idio-electric bodies.

12. The property which magnetic needles possess, of turning one of their extremities to the north and the other to the south, depends on the circumstance, as we have stated (8), of the terrestrial globe performing with regard to those needles the function of a real magnet. In the development of the effects which magnetic bodies subjected to experiment exhibit, attention to this action of the globe on magnetic needles is often extremely necessary. But as the science is yet too little advanced, relatively to this point, for us, by the aid of theory, to ascertain directly and with the proper precision the influence of that action, the defect has been supplied by the results of observation, which have been assumed as principles, from want of those which a more profound knowledge of the cause of natural magnetism would furnish. Among these results, there are two which are particularly remarkable, and which we proceed to state.

13. When a magnetic needle is suspended freely to a thread, its austral pole is drawn towards the north, while its boreal pole is attracted in a contrary direction, to the south; and it is evident, that in the case where the two forces which acted on this needle might vary in their intenseness, their resulting force acting always in a single right line, the needle constantly remained in that same line. But observation further proves, that the two actions which attract the needle in two contrary directions are apparently equal, in whatever point of the globe the needle may be. This is the necessary consequence of an experiment by Bouguer, who, having suspended by the middle, to a thread, a needle not magnetised, in which case the thread was vertical, and having afterwards magnetised the needle, observed that the thread remained in the same perpendicular position. Coulomb has obtained the same inference from the weight of a magnetised needle continuing precisely as it was previously to the magnetic virtue having been communicated to it. We see in effect, that if one of the two actions were superior to the other, its excess might be considered as a distinct force, the direction of which forming an angle with that of gravitation would give a compound motion, so that the needle would no longer exert the same pressure on the balance as it did before it was magnetised.

14. Before we proceed to the second result, we must premise, that the name of magnetic meridian has been given to that the plane of which coincides with the direction naturally assumed by a magnetised needle. Now let us suppose that the needle, being moved out of that direction, is then left to itself: it will immediately tend to regain its former position, and that tendency will be the effect of different forces acting at the time in oblique directions the whole length of the needle. Now supposing these forces to be decomposed, we may substitute in their stead a single force perpendicular to the needle, and applied to a point between the middle of the needle and the extremity answering to the nearest pole. This force is called the directing force of the needle, and observation shews that it is proportional to the sine of the angle which the needle, moved out of its natural direction, makes with that direction itself.

Coulomb has obtained this result by means of an experiment similar to the one he employed to ascertain the electric force placed in equilibrium with the force of torsion of a very thin metallic wire. We may recollect here, that the force of torsion, other circumstances being equal, is proportional to the angle of torsion, or to the number of degrees which any point, taken on the surface of the wire, passes over while the torsion is going on. This principle being laid down, and the needle suspended freely to a wire exempt from all torsion, Coulomb impresses upon this wire a torsion of a certain number of degrees; and the needle then departs from its magnetic meridian, till the directing force which tends to restore it to that meridian is in equilibrium with the force of torsion. The observer measures the angle which the needle then makes with its first direction, and gives to the wire a further torsion of a certain number of degrees. In this case the needle departs still more from its magnetic meridian, and at the same time the directing force that tends to restore it to that position, becomes augmented, because the forces of which it is the result act in less oblique directions along the needle. The torsion being at an end, the needle assumes anew the position under which the directing force is still in equilibrium with the force of torsion, which is measured by the first torsion, plus the augmentation it has received. Now it is ascertained that the number of degrees which the two torsions measure, are proportional to the angles which the needle makes with its original direction, in the two positions which furnished the equilibrium.

15. This result leads to another, which is merely a corollary from it. Whatever may be the direction of the real forces that act on the different points of the needle to restore it to its magnetic meridian when it has been made to depart from it, we may always ascribe to those forces a resultant parallel to the magnetic meridian; and it is easy to conceive, that this resultant must pass by a point in that half of the needle which

answers to the north pole of the globe, if the experiment be made in a northern country, or, in a contrary case, to the south pole. Now, assuming as a fact that the directing forces are in proportion to the sines of the angles of deviation, it appears that the resulting force we have mentioned is a constant quantity, passing always by one and the same point of the needle.

But it was not sufficient to have established, by means of the results we have stated, a theory of magnetic phenomena: it was necessary to determine the law by which the forces that act in these phenomena are governed at different distances. Many philosophers, who devoted their attention to this subject, had recourse to means so very imperfect, that we must not be surprised to see their results accord so little with one another, and be so remote from the true principle.

16. The precision of the methods employed by Coulomb, to ascertain this law, leaves no doubt that it follows the inverse ratio of the square of the distance, like that which governs electrical actions. But here, the manner in which the fluid is distributed in the bodies that were subjected to experiment, required distinct consideration; from the circumstance of these bodies having two centres of action that are in two opposite states, while the electrical bodies that were employed in researches directed to a similar end, were solicited only by a single electricity, which enabled the observer to consider all the forces as united in a single centre of action. For the present we shall content ourselves with remarking, that in the magnet the two centres of action are at a very trifling distance from the extremities.

Coulomb has obtained the end he had in view by two different methods. The first consisted in placing in a state of oscillation a small needle, 27 millimetres, or an inch, in length, directly opposite to the inferior centre of action of a magnetic steel wire, about 6·8 decimetres, or 25 inches, in length, situated vertically in the plane of the magnetic meridian.

Leaving for an instant the superior centre of action out of the question, we must conceive that the needle, while it makes its oscillations, is at the same time solicited by two forces, of which one resides in the inferior centre of action of the steel wire, and the other is the directing force of the needle. The effect of this last force also, when it acts alone on a needle in a deranged state as to its magnetic meridian, is to give to the needle an oscillatory motion. Now Coulomb had ascertained, prior to the experiment, that the needle, left to its own directing force, made 15 oscillations in 60 seconds. But it is with the needle here, as with the pendulum oscillating by virtue of its weight: and it is proved that the action of this force, to make the pendulum oscillate, is proportional to the square of the number of oscillations made in a given time, assumed for the unit of time. Accordingly, in the present hypothesis, which supposes the needle to be solicited at once by its own directing force and by that of the steel wire, the value of the last is obtained by subtracting the square of 15 from the number of oscillations made by the needle in 60 seconds.

To give precision to the experiments, it was further necessary to determine the distance at which the steel wire was supposed to act on the needle. Now we shall presently see, that this action depends upon two forces, each exerting itself on one of the poles of the needle, and conspiring, as it were, to impress upon it the same motion; and as the needle was very short, so that the distances of its poles at the centre of action of the steel wire differed but little from one another, the middle of this needle might, without striking error, be considered as the mean distance between those at which the two actions exerted themselves; and it was relatively to this point, that the question of estimating the force of the wire in presence of which the needle oscillates, was undertaken.

An example will serve to throw light on all that has been said. The needle, being so placed that its centre of action was at the distance of 108 millimetres, or 4 inches, from the steel wire, made 41 oscillations in a minute: placed afterwards at double that distance, it made but 24 oscillations in a minute. The total forces then, which solicited the needle in its two positions, were respectively as the square of 41 is to that of 24, or as 1681 to 576. If from each of these numbers we take the square of 15, or 225, we shall have for the ratio between the forces of the steel wire, that of 1456 to 351, which differs but little from the proportion of 4 to 1. And as the corresponding distances are to each other as 1 is to 2, we may infer, that the forces are in the inverse ratio of the square of the distances.

The number of oscillations that took place in 60 seconds, did not however always give exactly the quantity of action exerted by the steel wire. That exactness only obtained, as to sense, so long as the needle was at distances from the steel wire small enough to permit the neglecting the force of the superior pole of that wire, which was then directed according to a line deviating but little from the vertical, and which, besides, acted much farther off than the inferior pole. But when the needle was placed at a greater distance from the steel wire, then the part of the decomposition or resolution of that force which was in the horizontal direction, as well as that according to which the inferior pole acted, would become more appreciable with respect to the force of that same pole, and hence it was only by making the little requisite correction, that one could be able to represent the law sought, with the suitable precision.

17. The other method was analagous to that which Coulomb had employed in electricity. He converted the electrical balance into a magnetic balance, supplying, by means of a long magnetic needle, the lever suspended to the wire, and substituting for the copper ball a similar needle placed vertically on the magnetic meridian. Such was the respective disposition of the two needles, that when that which was moveable was on the point of touching the other, by preserving its nearly horizontal position, the contact took place at one of the centres of action of the first, and the inferior centre of the second.

The natural tendency of the needle to return to its magnetic meridian, was here also a particular action that combined itself with the reciprocal actions of the two needles; and the object was to discover the relation between these actions, by disengaging them from their combination. To succeed in this, Coulomb began with comparing the first force alone with the force of torsion; and he found, that if a torsion making an angle of 35 degrees was given to the wire that sustained the moveable needle, the needle deviated a degree from its magnetic meridian: and if the torsions were increased so as to form angles

that were successively twice, three times, four times, &c. 35 degrees, the needle deviated 2 degrees, 3 degrees, 4 degrees, &c. from its magnetic meridian; and thus, by taking from each impressed torsion the number of degrees which the distance of the needle from the meridian gave—that is to say, the quantity by which the torsion of the wire was counteracted, by virtue of the movement of the needle—he found that the force of the needle, to react against each torsion, amounted to as many times 35 degrees, as there were degrees in the arch measuring the distance of the needle from the meridian, proving indeed that the magnetic repulsions follow the inverse ratio of the squares of the distances.

2. *Magnetic Attractions and Repulsions.*

18. Having proceeded thus far on our subject, we are now capable of explaining the phenomena produced by magnets in consequence of their mutual actions. This explanation will in reality be very little more than expressing in other words the effects exhibited by idio-electric bodies, of which one part is in a vitreous, and the other in a resinous state, and particularly the tourmalin. We may suppose, if we please, that the boreal fluid of a magnet performs the same function as the vitreous fluid of the tourmalin, and the austral as the resinous fluid. On this supposition the resemblance of the phenomena, in the two branches of science, is limited to those which the two bodies exhibit, having each its natural quantity of fluid only, which may indeed be decomposed, but can never be either increased or diminished. Of consequence there will be this distinguishing character between the two fluids, that the electric fluid passes freely from one body to another, and, in certain circumstances, exhibits itself to the eye by sparks and streams of light, while the magnetic fluid acts in silence, and becomes perceptible only by the movements it occasions in other bodies placed within its sphere of attraction or repulsion. But if this mode of acting does not furnish the hope of phenomena equally striking with those which electricity affords, the phenomena it does exhibit should on that account be the more closely studied by the naturalist; since the more a cause would affect to conceal itself, the greater would be the sagacity of those who should succeed in penetrating the mystery.

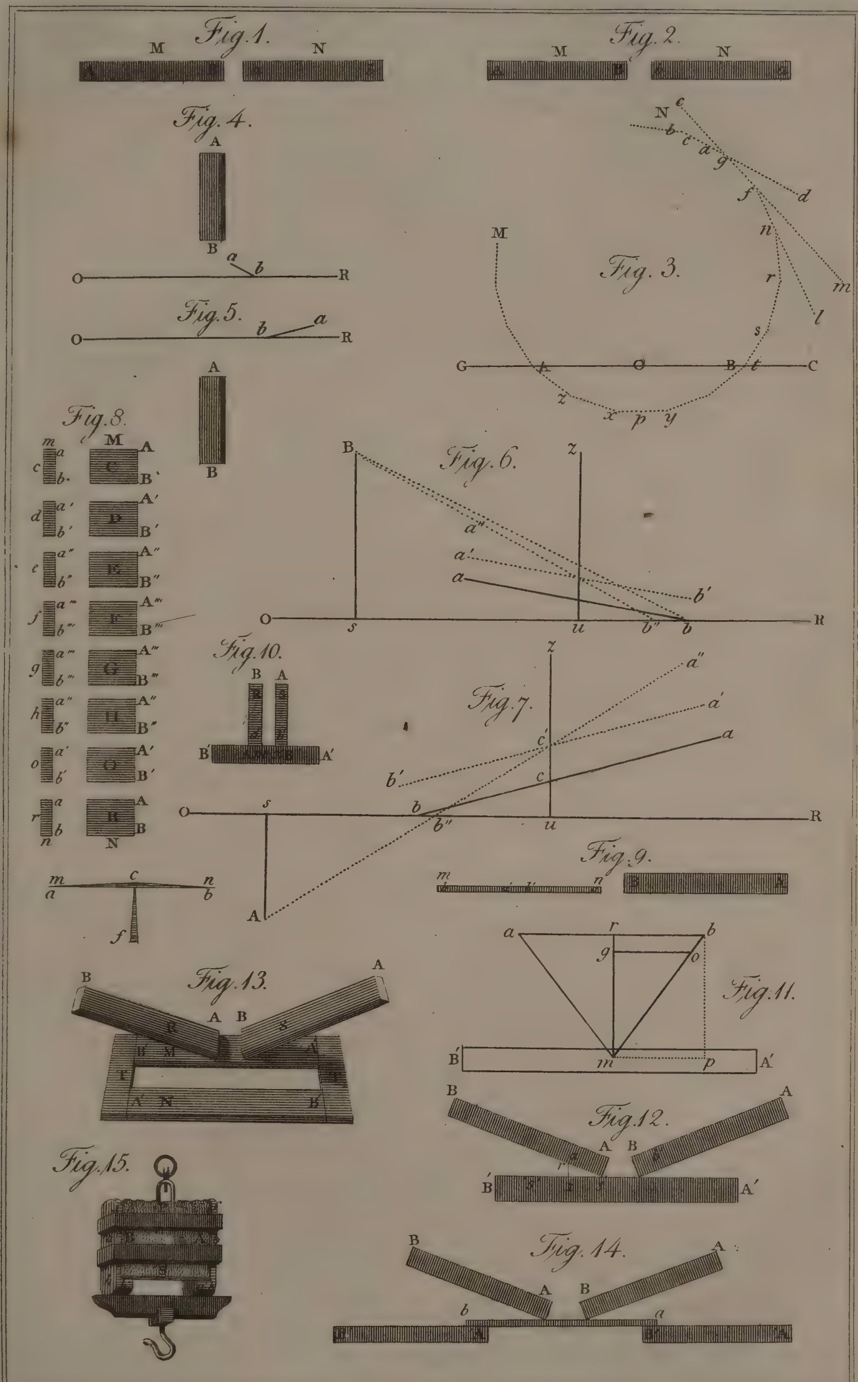
19. When two pieces of iron, A and B, placed near each other, are in the natural state, their equilibrium, like that of bodies which evince no sign of electricity, depends upon four forces that mutually destroy one another. Confining ourselves to the existence of these forces in the body A: since all action is reciprocal, we must conceive the austral fluid of this body to act by attraction on the boreal fluid of B, and by repulsion on its austral fluid; and that, on the other hand, the boreal fluid of A acts by attraction on the austral fluid of B, and by repulsion on its boreal fluid. A mode of reasoning similar to what we adopted relative to electrical actions, will prove that the four forces in question are equal to one another; and as there are two attractions and two repulsions, it follows that all the forces are in equilibrium.

20. When the two idio-electric bodies, having their parts in opposite states, are brought near each other, they attract by their differently electrised sides, and repel by the sides similarly electrised. In the same manner, if two magnets, M, N, (fig. 1, pl. 101), be so placed as to each other, that M turns its boreal pole, B, towards the austral pole *a*, of the magnet N; the boreal fluid of B, for example, being at a shorter distance from the magnet N, than the austral fluid of A, we may consider the magnet M as being wholly in the boreal state, by virtue of a force, B′, equal to the difference between the forces of A and of B; and as the force B′ acts by attraction on the austral fluid of the pole *a* more than it does on the boreal fluid of *b* which is farther from the magnet M, attraction will be the prevailing power; and if the two magnets have freedom of motion they will approach till they meet, and will adhere to each other: on the other hand, if the pole *b* were turned towards the pole B, as represented in figure 2, from the same mode of reasoning, with a simple inversion of the terms, it is obvious there will be repulsion between the two magnets. This will be the case also if we suppose these magnets to turn towards each other their poles, A, *a*, solicited by the austral fluid. In general, two magnets attract each other by their poles of different names, and repel each other by their poles of the same name.

21. Let us conceive the body N (fig. 1) a bar of iron, that, while in the natural state, finds itself so placed within the sphere of action of the magnet M, that that magnet turns its boreal pole, B, towards it. The force B′ of that magnet, equal to the surplus force of B over A, will act so as to decompose the fluid of N; and it is manifest, that the effect of this action will be to attract towards *a* the austral fluid disengaged from the combination, and to repel towards *b* the boreal fluid: in other words, the bar N will acquire itself the magnetic virtue, so that the nearest poles will be those of different names, and the two magnets will attract each other. The result will be the same, if we suppose the bar of iron to be presented to the magnet M on the opposite side, so that the magnet might turn its austral pole, A, towards it. Hence we infer, that when a bar, or any piece of iron in its natural state, is presented to a magnet, the action of the magnet communicates a magnetism contrary to that of the pole to which the bar was nearest, so that, in this case, there is always attraction between the two bodies. The naturalist here also merely avails himself of the magnetic fluid to repeat an electrical experiment; as that, for instance, in which a body, being in a certain state of electricity, first makes another body quit its natural state, and then attracts it to itself.

22. The bar which has received the magnetic virtue, acts in its turn on the magnet that has communicated it, by decomposing a new portion of the natural fluid of that magnet, of which one part is attracted towards the pole nearest to the bar, and the other to the opposite pole. The same thing happens, for a stronger reason, when the magnetism is communicated to a bar by the immediate contact of another bar already magnetised. And hence a sort of paradox extremely embarrassing to those who admit of the principle of vortices or of magnetic effluvia, which is, that a magnet should become stronger when it would appear to have ceded a portion of the fluid in which its strength consisted. Meanwhile, this increase of virtue acquired by the magnet is perceptible only inasmuch as the coercive force of the magnet is very inconsiderable.

23. Reaumur was the first who observed, with surprise, that a magnet, which had scarcely the




Mutlow, Sc. Russell Court.

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necessary power to sustain a piece of iron of a given weight, raised it more easily when the iron was placed on an anvil. In the theory we have adopted, this effect explains itself. The iron cannot be in contact with the magnet without becoming itself a magnet. Accordingly it so acts, in its turn, as to magnetise the anvil, and the anvil again reacts upon it to augment the quantity of free fluid in each of its poles, that is to say, it renders it more susceptible of attraction than it would have been without it.

24. Let us resume the hypothesis in which the body N (fig. 1, pl. 101) having passed from the natural state to that of magnetism, by the action of the body M, the respective positions of the poles were those which the figure represents. Suppose further, to give to the experiment a more favourable light, the two bodies to be in contact at their poles, B, *a*. If we place behind the body N, at the point *b*, a third body, in the natural state, the action of N will convert that body, in its turn, into a magnet of which the austral pole will be contiguous to the pole *b*; and this series may be continued to any length. There is a curious mode of varying this experiment, by presenting one of the poles of a small magnetic bar to one of the extremities of a sewing needle, and then to take up the bar so that the needle may remain suspended to it: the extremity of this needle will serve as a bait to attract a second needle, which will continue in like manner to be suspended to the first, and thus needle may be appended to needle as long as the magnetic force is sufficient to overcome the weight which tends by its action to break the chain.

25. There is another result, which, elementary as it may be at present, to those who understand but little of the theory of the magnet, exhibits so convincing a proof of that theory, that, for this circumstance alone, it deserves to be cited. Take two magnetic bars of nearly equal force, and present to each of them in turn a key which it is capable of raising, which it will do whatever be the pole that is placed in contact with the key. Then place one of the bars on a table so that one of its extremities may extend sufficiently for the key to remain suspended to it. Then put the other bar upon that to which the key is pendent, making the poles of different names correspond on the same side; and the key instantly falls, because the action which the pole in contact with it exerts to attract to itself the heterogeneous fluid of the key is nearly destroyed by the repulsive action of the second bar. Hence we see, that to explain the fact this principle is necessary, that iron placed in contact with a magnet becomes itself a magnet. We see, too, the ground of the surprise which this effect produces, when the mind is not sufficiently on its guard against the paradox that presents itself to the eye, which is, that a force is destroyed by the addition of another force, which, acting alone, produces in appearance an effect entirely similar.

26. The action of magnetism transmits itself freely through all bodies not susceptible of acquiring it. Place for instance a board, a pane of glass, a plate of copper, &c. between two magnets, and there will be no apparent alteration in their reciprocal actions. Charlatanism availed itself of this quality possessed by magnetic forces of not being impeded by any obstacle, to give to the most ordinary phenomena an air of magic, by means of machinery, that concealed from the spectator the real agent.

But here even experience, free from all idea of disguise, leads to results, formed apparently to disconcert the sagacity of the philosopher himself: but a theory is never better established than when its principles, which at first were supposed to be shaken by the difficulties arising from those very results, derive, on the contrary, new strength from the happy solutions they furnished of them. We have already had occasion to cite several such solutions, and what we are about to offer will exhibit other instances equally remarkable.

27. Place vertically, at the distance of a few centimetres from each other, two bars of magnetised iron, with their contrary poles turned to the same side; then cover the upper extremities with a thin board or piece of paper strewed with iron filings, and these filings will so arrange themselves as to form a multitude of curves of greater or less width, which all cross one another in points situated immediately above the upper extremities of the two magnets. Figure 62 is a kind of representation of this assemblage of curves.

Philosophers have considered this phenomenon as an evident demonstration of the action of magnetic vortices. Other experiments furnish only matter of conjecture as to their existence; but here do we not see them actually exhibit themselves?

We shall analyse this phenomenon, that we may the better understand its true interpretation, agreeably to the principles of our theory. Let C G (fig. 3, pl. 101), be a magnet having its centre of boreal action in B, and its centre of austral action in A. Conceive a ferruginous needle, extremely short, to be suspended freely at a point, N, nearer to B than to A. This needle, which we have hitherto supposed to be in the natural state, will itself become a magnet; and as we may then consider the magnet C G as solicited by a single force, the needle, by virtue of a certain quantity, B′, of boreal fluid, will assume an oblique position to the magnet, so that *a* will be its austral pole, and *b* its boreal pole. In this state of things, suppose the centre, *c*, of the needle to be moved a little along the line *a d*, or the line of prolongation of the needle, so that its centre, for example, shall be in *g*. In consequence of this single movement, the extremity, *a*, of the needle will approach towards the point B: from which it follows that the needle will assume a new position less oblique than the preceding, and directed according to the line *e m*, which will make with the line *b d* an infinitely small angle. If we give to the centre, *c*, a further movement along the line *e m*, so that this centre shall be in *f*, the needle will take another direction, such as *f l*, making a very slight inclination with the preceding direction. If we continue to move the centre of the needle in the same manner, it is obvious that this centre will describe a curve *c g f n*, &c. the sides of which will coincide with the different directions of the needle.

In this curve there will be a point where the needle, which continually departs from the parallelism with C G, will take a direction *n r*, perpendicular to that line. Beyond that point, the extremity of the needle still tending to approach nearer and nearer to the point B, the new sides, *r s*, of the curve will be inclined in a contrary

way to the first sides, $c\,g$, $g\,f$, &c. and at last, when the extremity, $a$, of the needle shall be indefinitely near to the point B, the curve will pass through that point. Below, it will form sides, which will approach continually nearer to parallelism with C G; and when the centre of the needle shall be at $p$, situated directly under the centre O of the magnet C G, the direction, $x\,y$, of the needle will be parallel to C G, because of the equilibrium between the forces of the poles B and A. Beyond that term, the force of the pole A being the preponderating force, the curve will incline towards A, and at last will pass there, forming a new branch, $x\,z$ A M, of the curve, similar to the opposite one.

Let us now imagine the centres of a multitude of extremely short needles to be arranged on the circumference of this curve: these needles will shortly assume such positions, that each of them will direct itself according to the tangent at the point of the curve, which will be confounded with the centre of the needle; and as all the needles are directed towards each other by their poles of different names, they will adhere to one another, and will form a continued curve.

If particles of filings be substituted for these needles, and instead of supposing these particles freely suspended, we conceive them to be laid on a plane where they experience a degree of friction, the resistance produced by the friction will prevent them from gliding towards the points A, B, which act to attract them; at the same time this attractive force may be such, that the filings will take the direction which they would have had, if placed so as to have been moveable round their centres, especially if we second their tendency, by slightly shaking the plane that supports them, so that they will form on that plane by their junction the curved line we have mentioned. We may comprehend without difficulty, that if the plane is covered with particles of filings, the particles will take a direction to the sides of different curved lines adapted to the corresponding systems of individual action, and the curves will have two common intersections at the points A and B, which is conformable to observation.

28. We may explain with the same ease a little phenomenon bearing some affinity with the preceding one, and which is the more curious, as it would seem, by its singularity, to make experience contradict theory. It is this: Place on a piece of board, or a table, O R (fig. 4), a slender iron wire, two or three millimetres in length, and hold above the table, at the distance of a few centimetres, a magnetic bar, A B, in a vertical position, having its lower extremity, which may be either the boreal or the austral pole, sideways as to the wire. The wire instantly raises it at the extremity nearest the bar, taking an oblique position such as $b\,a$. Shake the table slightly so as to jolt the wire a little, and you will see it regularly approach towards the bar, till it places itself in a vertical situation immediately under the pole B.

Thus far there is nothing which the observer might not have foreseen. But place the bar underneath the table, as is represented in figure 5, and proceed with the experiment as before, and the wire $b\,a$ will raise itself again, making an angle more or less acute with the surface of the table; but in proportion as we slightly shake the table, the needle will continually remove from the bar, approaching the point R, though it is evident that the bar exerts on it an attractive force.

To solve this paradox, let us take the case in which the bar was above the table. Let B (fig. 6) be the inferior centre of action of this bar. At the moment the wire rises, we may consider it as a small lever, $a\,b$, the fulcrum of which is at the point $b$, and the extremity $a$ is solicited at once by the attraction of the pole B, and by the weight which acts to make it descend. Now this last force opposes itself in part to the effect of the attraction of the pole B, so that the angle $a\,b\,s$, formed by the direction of the wire with the plane O R, is less than the angle B $b\,s$, which would have been formed on the supposition of the wire directing itself according to the line $b$ B, which passes through the pole of the bar.

Now let us suppose the wire $a\,b$, in consequence of some force, to be detached from the plane O R, so that its centre of gravity, $c$, shall be a little above its first position, for instance at the point $c'$ in the vertical line $u\,c\,z$: if we suppose, for an instant, it has taken the position $a'\,b'$, parallel to $a\,b$, it will not preserve it; but its extremities, $b'$, $a'$, having both in that case freedom of motion, the wire will turn round the point $c$, and will tend to direct itself on a line passing through the pole B, which cannot take place without its extremity $b'$ lowering itself towards the plane O R; and when it shall touch it, the wire having a direction such as $b''\,a''$, of which the prolongation passes through the pole B, or nearly so, its extremity $b''$ will be nearer the vertical line $s$ B, than when it had the position $b\,a$. At the same time, the resistance of the plane O R offering a new fulcrum to the small lever which rests on it by its extremity $b''$, this extremity will remain fixed, while the opposite extremity $a''$ will descend a little from the effect of gravity, so that the angle $a''\,b''\,s$ will diminish by a small quantity, continuing however always larger than the first angle $a\,b\,s$.

During the descent of the point $a''$, the centre of gravity $c'$ will quit the vertical line $u\,z$, and place itself in the point $x$, on an arch of which $b''\,c'$ will be the radius, and accordingly it will approach nearer to $s$ B. If we shake the plane O R a second time, and imagine a new vertical line, passing through the point $x$ and along which the centre of gravity of the wire moves, the same effect will be repeated; and this will be the case every time, so that the point $b''$ will have a progressive motion towards the point $s$, and will at last coincide with it, by directing itself according to the vertical line $s$ B.

The supposition we have made of a vertical line, of which the centre of gravity of the wire follows the direction, by raising itself above its preceding position, is not very remote from the truth; for the distances of the poles $a$, $b$, of the wire from the pole B of the magnet, differing but little from one another, on account of the shortness of the wire, the two actions of the pole B, of which one attracts the pole $a$, and the other repels the pole $b$, are nearly equal; and as the shaking of the plane is supposed to act in a direction diametrically opposite to that of the weight, it follows, that the centre of gravity of the wire remains, as to sense, in the same vertical line, both while the wire ascends and while it descends.

The experiment ought to exhibit effects the reverse of these, when the magnet is placed underneath the plane O R, as in figure 7, where we

suppose the pole A, the nearest to the plane O R, was the austral pole, which is immaterial as to the result. In this hypothesis, the wire having taken of itself the direction $b\,a$, if we give a slight shaking to the plane O R, and $c'$ be the new position of the centre of gravity of the wire, it is easy to perceive, that this wire, instead of remaining in a direction, $a'\,b'$, parallel to $a\,b$, will lower itself by its extremity $b'$, in such manner that when it shall touch the plane O R, the direction of the wire will be in the line $a''\,b'$, A, which passes through the pole A of the magnet: whence it follows, that the extremity $b''$ will be farther from the vertical line A $s$, than in its first position. But at the same moment the wire, supported at the point $b''$ by the plane, will descend by its extremity $a''$, in consequence of the weight, and its centre of gravity will be transferred to the right of the vertical line $u\,z$; from which it is easy to conceive how the new shocks given to the plane O R will determine it to approach the point R, so that the attraction exerted on it by the magnet will appear to be changed into repulsion.

29. We shall state another very easy experiment, which furnishes a numerous assemblage of little phenomena, similar to the one we have just explained. Instead of a single iron wire, put on the board O R a pinch of filings, and so place the magnet underneath the board, that its direction if continued would pass through the centre of the part strewed with the filings. In proportion as you agitate the board by slight concussions, you will see the particles of filings disperse themselves on all sides as if they were moved upon the radii of a circle, leaving void the spot they first occupied, and ranging themselves round it in the form of a disc.

30. Before we proceed farther, it will be necessary to give an idea of the manner in which the two magnetic fluids are distributed in the interior parts of a magnet. This distribution, which is analogous to that of the electric fluid round a conductor, or of the two electric fluids in a tourmalin, is in general so arranged, that the magnetic densities being very considerable near the extremities, decrease rapidly from thence, and become almost nugatory in a very manifest space situated towards the middle of the magnet. It follows, that the centres of action of these bodies are, as we have stated (16), at a short distance from their extremities. For example, in a steel wire 67·5 cent. or 25 inches long, this distance was but 22·5 mill. or ten lines. We may form a pretty accurate judgment of this proximity of the centres of action with regard to the extremities of a magnetic steel wire or bar, by holding such a bar in a vertical position opposite the freely suspended needle of a compass, and by raising and lowering it, so that the different points in its length may be successively presented to the needle: in this case we shall observe in the needle a manifest tendency to a certain point of the bar, which will be little remote from the extremity situated on the same side.

This distribution of the two fluids in a magnet depends on the principle that the forces of these fluids conform to the inverse ratio of the square of the distance. To judge from appearances, the action of each moiety of a magnet proceeds wholly from the presence of a single fluid in a state of freedom. But every thing induces us to admit the happy hypothesis of Coulomb. It consists in regarding every molecule of iron as a small magnet, that has its boreal pole and its austral pole equal in force to each other. All the petty magnets of which a magnetic bar is the assemblage, are ranged in different files parallel to the axis of the bar, in such manner that the boreal pole of one is contiguous to the austral pole of the next, or reciprocally. We shall attempt to shew how this hypothesis furnishes an equivalent to what would take place if each moiety of the magnet were in a single state of magnetism.

31. Conceive, in the first place, an indefinitely thin needle, $m\,n$ (fig. 8), composed of an infinite number of small partial needles, $c, d, e, f$, &c. and suppose this needle to have been put into a state of magnetism by the action of a magnet. In this case, all the contrary forces of the contiguous poles $b, a'$; $b', a''$, &c. * will be equal to one another, so that their actions will be reduced to zero. As to the forces of the two extreme poles, videlicet, that of the pole $a$ of the needle $c$, and that of the pole $b$ of the needle $r$, which alone are in action, on account of their distance, the quantities of fluid on which they depend residing only in two points, these forces are supposed to act on all the intermediate poles at infinite distances, and their action is of consequence inefficient to alter the state of the whole needle. Hence, if there existed a magnetic needle similar to this, its two centres of action would be in the extreme points, and all the space between would be supposed to be in the natural state.

But the hypothesis of a needle infinitely thin is merely ideal, and all magnets have necessarily a thickness more or less apparent. Yet we may discover, by a train of reasoning, what ought to be the result of the reciprocal influence of different needles resembling the needle $m\,n$, of which a magnet is supposed to be the assemblage, to place that magnet in the state in which the experiment presents it to us.

Let us imagine that M N being the magnet in question, the distribution of the two fluids is at first the same in each of its component needles, as that which takes place in the needle $m\,n$; let us suppose, further, this needle to be placed in contact with the magnet M N, so as to become one with it, and let us examine the action which it ought to exert on the different points of the needle. If we divide in imagination the magnet M N into as many parts, C, D, E, F, &c., as there are constituent needles in the needle $m\,n$, we shall have a series of magnets in which the forces of the contiguous poles B, A'; B', A'', &c. will mutually destroy one another; and thus M N, in the present supposition, will not be able to act on the needle $m\,n$ but by means of forces which have their seat in the extreme poles; such are the pole A of the part C, and the pole B of the part R. Now, each of these forces is that of a fluid which extends over a surface equal to the base of the part C or R, composed of an infinitude of points; from which it follows, that it acts at finite distances on all the little needles, $c, d, e, f$, &c.

Now the fluid of the superior pole A attracts to itself the boreal fluid of the pole $b, b', b''$, &c. of each of these needles, and repels the austral fluid of the pole $a, a', a''$, &c. There will then be a certain number of heterogeneous moleculæ that will re-unite themselves in every needle, and

* The letter $b$ indicates here, as before, the boreal pole, and the letter $a$ the austral pole.

compose anew a portion of the natural fluid. But the fluid of the pole A acts more forcibly on the needles near the extremity $m$, and more feebly on those which are at a certain distance from its extremity. The quantity of natural fluid composed anew will therefore decrease from one needle to the other; and by a necessary consequence, the portions of fluid which remain in a disengaged state, will, on the contrary, go on increasing from the extremity $m$. The same effects will take place in the contrary way, by virtue of the action of the inferior pole B on the needles $r$, $o$, $h$, &c.

It follows from what has been said, that if we represent by $a$, $b$, $a'$, $b'$, &c. the quantities of fluid which remain in a disengaged state in the needles of which these letters have served to designate the poles, and if we compare the two needles $c$, $d$, we shall have $a'$ greater than $b$; in like manner by comparing $e$ with $d$, we shall have $a''$ greater than $b'$, &c.; from which we conclude, that the action $a'—b$ of the first two poles, as well as the action $a''—b'$ of the two next, is equivalent to that of a single austral pole animated by a force equal to the excess of $a'$ above $b$, or of $a''$ above $b'$. By employing the same mode of reasoning with regard to all the following poles till we come to the middle of the needle $m\,n$, we shall infer that all this half is in the same case as if it were solicited by a series of decreasing quantities of austral fluid. With respect to the inferior half of the needle $m\,n$, the reverse will be the fact. The differences, $b'—a$, $b''—a'$, &c. between the quantities of fluid belonging to the constituent needles $r$, $o$, &c. will each represent a boreal force, and all this second half of the needle will be considered as in a state of boreal magnetism. Moreover, the points equally distant from the extremities being solicited by equal and contrary forces, we shall have, in the middle of the needle, $b'''—a'''=0$; whence it follows, that that point will be neutralised.

But as the forces of the magnet M N follow the inverse ratio of the square of the distance, they will act on the needles near the extremities with an intenseness incomparably greater than on those at a certain distance from these extremities; so that if the needle $m\,n$ be rather long, the effect of these forces on the middle part of the needle will be almost nugatory. Accordingly the fluids will preserve in this part nearly their primitive state; and that state, as follows by consequence, will differ but little from the natural state.

What we have said of the indefinitely thin needle, $m\,n$, may be equally applied to all the needles of which a magnet, M N, having a manifest thickness, is the assemblage, and that by virtue of the reciprocal actions of those needles; so that at the very instant in which this needle has been drawn from the natural state, there is established in its interior a general distribution of the two fluids, similar to that which, to aid our conceptions, we have supposed relatively to a single needle.

32. It is now easy to solve the difficulty presented by a phenomenon, that has excited in no small degree the astonishment of naturalists, and of which Æpinus himself gives but a very unsatisfactory account. Cut a magnetic bar towards one of its extremities, so as to detach a portion of it, that may be ever so short, and instantly that portion becomes itself a complete magnet, having also its two halves solicited by equal and contrary forces. How, by the ordinary theories is it conceivable, that this segment, which was before completely in a unique state, like the part from which it was separated, should all at once, by a sort of creation, be furnished with a double magnetism?

To unriddle this seeming paradox, let us again have recourse to the supposition of the indefinitely thin needle, $m\,n$, which presents, as we have seen, a succession of opposite poles, equal in forces, and contiguous two and two, except the first and last, which are apart. If we were to break this needle, at any point whatever of its length, it is evident, that each part would have still at its extremities two poles animated by equal and contrary forces, of which the one, which was at first remote, had then all its energy, and the other, which was balanced by the force of the contiguous pole, would be placed in activity, on separating itself from that pole.

The same thing will have place, if we suppose a portion of the magnet M N has been detached from its length; with this difference, that the pole situated at the place of division will at first have more force than that of the opposite extremity; since in the magnet, when entire, the quantities of the fluid went on increasing from one pole to the other, from each extremity. But at the very instant, the state of the whole system will change so as to complete the conditions of the equilibrium, which requires that every thing should be the same in both parts, at equal distance from the extremities.

33. We have seen that tourmalins present a similar phenomenon; and in reality it is natural to suppose, as the component moleculæ of bodies, whether magnetic or electrical, are little complete crystals, similar in form, and disposed symmetrically in the whole body, that each molecule must completely undergo the double action of electricity or of magnetism, to place its two halves in different states: and accordingly the distinction between these states, as to entire bodies, is only a consequence of what takes place relatively to each molecule. The effect of the whole assimilates itself to that of the component parts; and thus, on this hypothesis, which is extremely plausible, there is no longer any thing extraordinary in the phenomena produced by those bodies, which may be termed the *polypi of the mineral kingdom*.

### 3. *Communication of Magnetism.*

34. We have already spoken (21) of the action exerted by a magnet on a piece of iron which, being first in the natural state, was afterwards placed within the sphere of activity of that magnet; and we have seen that it acquired itself the magnetic virtue, so that its part turned towards the magnet was in an opposite state to that of the pole which had acted on it at a nearer distance. We have now to explain the different means which have been devised to carry to the highest possible pitch the magnetism acquired by communication. But we must first give an idea of a result that has sometimes taken place, in consequence of an irregular distribution of the two fluids put in motion in a body passing to the state of magnetism.

35. Suppose A B (fig. 9) to be a powerful magnet which acts on a bar of iron, $m\,n$, to communicate to it the magnetic virtue: the action of this magnet, which will depend on the excess $B'$ of the force of the boreal pole B over that of the austral pole A (551), will attract the austral

fluid $a$ in the parts of the bar near $n$, and repel the boreal fluid $b$ in the parts situated towards $m$. Now there are two circumstances that occasion in the motion of this last fluid some obstacle: first, the difficulty which its moleculæ experience in moving the iron, which proceeds from the coercive force, and next the repulsion exerted on these moleculæ by those of the fluid already accumulated towards the extremity $m$; a repulsion that augments continually, in proportion as the accumulation itself continues to augment. Accordingly there may be a term where the resistance arising from the concourse of the two causes may become superior to the repulsive power of the force B′, and the fluid will then, if we may so speak, be choked up in some point, $b'$, by yielding to that resistance, and may even so abound there, that its action shall produce in the neighbouring part $a'$ austral magnetism.

The bar of iron, $m\,n$, will therefore, in that case, have four poles in succession to one another, and possessing alternately austral magnetism and boreal magnetism. To these different poles succeeding one another in the same magnet, the name of *consequent points* has been given. There is however a great difference between this succession of contrary poles and that which results from the moleculæ of iron being so many minute magnets of which the poles in contact have opposite forces; for we have seen that these forces are equivalent to a single force, which does not vary in different points except by its intensity, whereas every consequent point determines a force really contrary to that which the part in which it resides would manifest without it.

36. To render more intelligible what we have to add upon this subject, we shall resume here, with more detail, what has been said (11) of the difference which the greater or less degree of hardness of the iron occasions, in general, in the internal motion of the fluid. Steel does not accommodate itself to this motion without great difficulty; but the two component fluids having once overcome the obstacles which prevented them from distributing themselves in the two halves of a steel bar, the same difficulty which had retarded this distribution opposes itself to the effect of the attractive force, which tends to bring back the two fluids to one another, and by their combination restore the bar to its natural state. On the contrary, in soft iron, the disengagement of the two fluids is effected more easily and more abundantly; but the return to the state of combination takes place afterwards with the same ease; from whence it follows, that soft iron readily acquires a considerable degree of magnetism, but which is at the same time fugitive; while steel, magnetised with much greater difficulty, preserves its virtue longer; and it is for this reason that steel alone is used for making artificial magnets.

37. The most simple way of communicating magnetism to a steel or iron rod, is to rub this rod with a magnetised bar, gliding one of the poles of the bar along the rod through its whole length, and repeating several times this operation in the same direction. Suppose the pole in contact with the rod to be the boreal pole of the bar: the action of that pole attracts the austral fluid of the rod, and repels the boreal fluid; whence it results, that the part of the rod in contact with the bar, tends incessantly to the austral state of magnetism, and when the bar reaches the extremity, and is then taken away, the part it has quitted is in that same state of magnetism.

38. During its motion the bar acted at the same time on each part, at a certain distance, to repel the boreal fluid; but in proportion as it advanced towards the extremity where its motion was to end, it destroyed the effect of that action in the points it approached, and made them pass to the austral state of magnetism; whence it follows, that at the termination of its motion, the parts situated within a certain limit of the extremity which it came to quit possess austral magnetism, and the ulterior parts, situated towards the opposite extremity, have acquired boreal magnetism; and accordingly, when the rod shall afterwards be left to itself, the two fluids, to answer to the conditions of equilibrium, will be distributed in such a manner that all that half over which the bar last passed, will possess austral magnetism, and the other half boreal magnetism.

39. If a new friction be given in the same direction as before, it will partly diminish the effect of the preceding, and partly increase it; and so long as the second effect shall prevail over the first, the rod will continue to acquire magnetism. But this augmentation of the magnetic virtue will be so extremely limited, that after a few strokes the communication of magnetism will cease.

40. The method of double contact, invented by Mitchell, is much more advantageous. It is this: Take two magnetic bars, R, S, (fig. 10), and raise them vertically at a short distance from each other, so that their opposite poles, A, B, may correspond. In this situation make them glide from one end to the other, backwards and forwards alternately, along the rod, B′ A, that is to be magnetised, taking care that they never pass beyond either extremity of the rod. After a few strokes, when the bars are near the middle of the rod, take them away in their perpendicular direction to the rod. The result of this operation, is to place each extremity of the rod in the contrary state to that of the inferior pole of the bar, situated towards that extremity.

41. To understand the effect of this method, let us consider first, what passes in the part of the rod answering to the interval between the centres of action $a'$ and $b'$ of the inferior poles, the only ones which have any very perceptible influence on the result. It is easy to perceive, that each molecule of the austral fluid, such as $x$, comprehended in that intermediate part, is attracted from left to right by the boreal centre of action $b'$, and repelled in the same direction, by the austral centre of action $a'$. On the contrary, each molecule, $m$, of the boreal fluid is attracted from right to left, by the centre $a'$, and repelled in the same direction by the centre $b'$. These effects are contrary, as far as a certain point, from the influence which the bars exert on the ulterior parts; for example, the bar S repels towards the right the moleculæ, $y$, of the boreal fluid which are behind it, while it repels from right to left those which are before, in the interval between the centres. But the first repulsion is in a great measure destroyed by the contrary attraction of the other bar R, on the same moleculæ; so that every thing being counter-balanced, the operation goes on incessantly towards its object, which is, in general, to produce austral magnetism in the half of the rod situated to the right, and boreal magnetism in the opposite half. The precaution that is observed at the end of the opera-

tion, of taking away the bars when at the middle of the rod, tends to favour the symmetrical distribution of the fluids in the two halves of the rod when left to itself.

42. A consideration presents itself here relative to the distance requisite between the bars, that their actions may have the greatest possible influence on the principal effect, that is to say, on that which is produced in the space intercepted between those bars. The determination of this distance depends upon the height of the centres of action, $a'$, $b'$, above the bar, $A'$, $B'$, which receives the magnetic virtue. To understand this, suppose that the bars, being at a distance from each other, have their centres of action in $a\ b$ (fig. 11), and that $A'\ B'$ be still the body that was to be magnetised. For the greater simplicity, let us confine our attention to the repulsive action of the centre $b$ on a particle, $m$, of the boreal fluid contained in the bar $A'\ B'$. This action being directed obliquely, with respect to the length of the bar, which is the direction in which the fluid must be impelled to arrive at $B'$, it decomposes itself into two other actions: one, answering to $b\ p$, perpendicular to $A'\ B'$, is nugatory as to the proposed effect; the other corresponding with $b\ r$, drawn parallel to $A'\ B'$ till it meets $m\ r$, perpendicular to the line joining the two centres; and this second force alone contributes to the motion of the particle towards $B'$.

Now, on the one hand, the line $b\ r$ increases in proportion as the angle $b\ m\ a$ is less acute, or, which is the same thing, in proportion as the two bars are farther from each other; but at the same time, the intensity of the action of $b$ diminishes, by reason of the greater distance between that centre and the molecule $m$. Suppose this distance to be nothing, the action represented by $b\ r$ will vanish; on the contrary, suppose it infinite, the intensity of the force $b$ will become zero in its turn. There is therefore, with respect to the angle $b\ m\ a$, a certain mean measure, giving for the real force the greatest possible value. Æpinus, who supposed that the action of the magnetic forces followed the inverse ratio of the simple distance, found that the angle $b\ m\ a$, in the case of a *maximum*, was a right angle; but if the real law be established, that is, the law which follows the inverse ratio of the square of the distance, we shall have 70° 31′ 44″ for the measure of the angle in question.

Suppose, for example, that the bars employed in this experiment were in the same state as the steel wire of which we have before spoken (30), which was 67·5 centimetres in length, having the centres of action 22·5 millimetres from the extremities; to obtain the *maximum* of action, the bars must be placed at the respective distance of 32 millimetres.

43. Æpinus, in the method of double contact, has followed a different process, by inclining the bars in a contrary way, as is represented in fig. 12, so that each shall make a small angle of about 15 or 20 degrees with the bar $A'\ B'$. By this mode of operating, he supposes two things to be obtained: first, that the centres of action, $a'$, $b'$, which were raised to a certain height above the surface of the bar $A'\ B'$, when the bars which acted upon it were in a vertical position, are in the present case much nearer to it, and their action becomes in consequence much more efficacious. Secondly, the interval between the centres of action being greatly augmented in consequence of the very obtuse angle which the bars make with each other, this new circumstance widens the limits between which the effect of the conspiring forces was compressed, and proportionally favours the activity of those forces.*

But these advantages were in a great measure balanced by the inconvenience which attended the operation, or frequently producing in the bar $A'\ B'$ consequent points, whose action, though slight to the senses, was not to be neglected; especially when the needles of mariners' compasses were in question, their perfection partly depending on their poles. To comprehend this inconvenience, let us suppose that the bars A B in moving from $A'$ to $B'$ are at the middle of the bar $A'\ B'$. Let $r\ z$ be a perpendicular let fall from the centre of action of A on this last bar, A molecule, $s$, of the boreal fluid situated to the right to this perpendicular is strongly solicited to approach it, by virtue of the action of the two bars A B; but at the same time a molecule, $s'$, of the same fluid situated to the left of the same perpendicular is attracted in an opposite direction, and this action is no longer sensibly destroyed by the contrary force of the centre $b'$, as in the case where the bars A B are situated vertically. Now it may happen that the fluid, $s$, $s'$, shall be so accumulated in the space it occupies, that when the motion of the two bars shall afterwards be continued, the coercive force of the bar $A'\ B'$ shall permit them only to repel back again towards $B'$ a part of the same fluid. There will consequently be formed in the space $s\ s'$ a boreal pole, which in its turn will give rise to an austral pole in the next space situated towards $B'$, and thus will introduce into that space a kind of perturbating force in regard to that of the extremity $B'$.

To remedy this inconvenience, Coulomb, having placed the two bars A B on the middle of the bar $A'\ B'$, inclining them as Æpinus did, draws them in contrary directions to each other, till at a small distance from their respective extremities, and then begins the friction anew, always proceeding from the middle. By this method the forces of the centres, $a'\ b'$, being more divided, without ceasing to be conspiring forces, no longer produce those accumulations of fluid whence consequent points result.

44. To obtain two bars strongly magnetised, four are taken all equal and similar to each other, of which two at least should have a commencement of magnetism. The first two are placed parallel to each other, as M, N, (fig. 13), and against their extremities two parallelopipeds,

* The method of double touch, or double contact, was first published by Mr. Canton, who availed himself of the ingenious experiments of Mr. Mitchell of Cambridge, to whom the discovery is justly ascribed by Haüy. The method here attributed to Æpinus, is due to Antheaume, and was described in his memoir *sur les Aimans artificiels*, 1766. According to Professor Robison, the great advantage of this method is the regularity of the magnetism which it produces. We never find more than two poles; and when the bars are hard and of uniform texture, the polarity is very little diffused, and seemingly confined to quite a minute space at the very extremities of the bar; which is a prodigious advantage in point of strength. This method too, appears the only one, by which two bars can be impregnated joined end to end, considering them as one bar.

T, T, of soft iron are applied, the whole forming a rectangular figure. The two bars, R, S, which are already in a magnetic state, are then used, to communicate the same virtue to one of the first bars, as M for example, following the method of Æpinus, or, if it be preferred, that of Coulomb. This bar acquires poles, the positions of which are indicated by the figure, and already the other bar N, by virtue of the communication that is established between it and the bar M, by the intermediation of contacts, receives itself a commencement of magnetism; and it is easy to conceive, that each of its poles corresponds to the contrary pole of the bar M, as may also be seen by the figure. After a certain number of strokes, the bar M is turned, without changing the disposition of its poles, and the operation is repeated on the other surface. Similar frictions are successively given to the two surfaces of the bar N, taking care to reverse the positions of the poles of the bars R, S, because those of the bar N are themselves situated in a contrary direction to the poles of the bar M. This done, the bars R, S, are substituted for the bars M, N, and the last are used to augment the virtue of the others. When the communication of magnetism is supposed to have attained its greatest extent, those bars which were last subjected to friction are preferred, to magnetise steel needles, and other bodies of the same nature.

The effect of this operation is favoured by making the other two bars concur as auxiliary means in producing it. In that case, those bars are directed on one and the same line, as represented in fig. 14, at a less distance than the length of the needle that is to be magnetised, and the needle has given to it the position *a b*, answering to the interval between the two bars, so as to rest upon them by its extremities.

If the bars M, N, (fig. 13), had already a certain degree of magnetism, it is evident that they ought previously to be placed in their respective positions analogous to those which the figure represents, where the poles of different names correspond on the same side.

45. Suppose that the bars M, N, were in some way or other to be kept in an invariable position, relatively to themselves and to one of the contacts T, and that, having suspended this apparatus vertically, so that the point at which it is held may be on the side of the fixed contact, there were to be placed on the side of the other contact a piece of soft iron with a hook below it, like that represented underneath the magnet P S (fig. 15.). By suspending different bodies to this hook, we shall be able to ascertain the weight the magnet is capable of bearing by virtue of its attractive force. It is upon this principle that artificial magnets are constructed; all the difference is, that for the bars M, N, two bundles of thin steel laminæ are substituted, which, having before been magnetised separately, are then so united, that they might in each bundle be contiguous by the poles of the same name. Coulomb has formed magnets of this kind that weighed about ten kilogrammes, or twenty pounds, and of which the power was equivalent to a weight of about fifty kilogrammes, or a hundred pounds. In small magnets the proportion between the weight of the apparatus and that of the charge is greater. Ingenhousz cites an instance of one of these small magnets that supported more than a hundred times its own weight, and adds, that Dr. Knight told him the weight might have been extended much farther.*

46. The name of armour is given to the plates of soft iron applied to natural magnets at the places of the poles, and that contribute either to preserve their virtue, or even to increase it. Previously to arming a magnet, it is shaped like the rectangular parallelopiped P S (fig. 15.): so that if we conceive a plane passing at equal distance from the two opposite surfaces, and parallel to those surfaces, the two halves intercepted by this plane will be in two different states of magnetism, like those of a magnetised bar. Each armour, $f\ h$ or $f'\ h'$, has the form of a carpenter's square, of which one of the branches, $f\ f'$, which is longer than the other, and is called the *leg* of the armour, is applied to one of the surfaces we have mentioned; and the other branch, $h\ h'$, which is the *foot* of the armour, is applied to the adjoining surface, which may be considered as the base of the parallelopiped. Of this base the armour covers only a space a few millimetres in length.

Let us now analyse the effect of the armour which answers, for example, to the pole B of the magnet. The force of this pole acts so as to decompose the natural fluid of the armour; it attracts the austral fluid in the parts of the substance of the armour nearest the loadstone, and repels the boreal fluid in the parts most remote; and as it acts much more efficaciously on the leg $f$, the austral fluid will in preference pour itself into the substance of that leg, and the boreal fluid will be driven back in great measure into the foot $h$, as much by the action of the magnet, as by the mutual repulsive force of its own moleculæ.

The foot of the armour will accordingly acquire the kind of magnetism which exists in the corresponding part of the magnet, that is to say, boreal magnetism. By a similar mode of reasoning we may prove, that contrary effects take place with regard to the other armour.

Now the leg acts in its turn, by an austral magnetism, on the boreal pole of the magnet, to attract there a new fluid; an effect that is but weakly balanced by the opposite action of the foot of the armour, which is at a greater dis-

* Among artificial magnets, those which are bent into a form resembling a horse-shoe, so that the two ends nearly meet, and therefore called *horse-shoe magnets*, are reckoned comparatively very powerful. To render such a shaped piece magnetic, place a pair of magnetised bars against the ends of the horse-shoe, with the south end of the bar against that of the horse-shoe which is intended to be the north, and the north end of the bar to that which is to be the south; the lifter, of soft iron, to be placed at the other end of the bars. Also rub the surfaces of the horse-shoe with the pair of bars disposed like the legs of compasses when a little open, or with another horse-shoe magnet, turning the poles properly to those of the proposed magnet; and being careful that these bars never touch the ends of the straight bars. To prevent a sudden separation of the bars from the horse-shoe, which would considerably diminish the force of the latter, slide on the lifter, or support, to the end of the horse-shoe magnet, but in such a manner that it may not touch the bars; they may then be taken away, and the support slid to its place.

tance. By a necessary consequence the foot will acquire an increase of force; and it is, in general, to this combination of reciprocal actions that the advantage is to be ascribed which the armour possesses of giving new activity to the force that loadstones have received from nature.

The leg of the armour ought to be of such a degree of thickness, that it might neither be diminished nor increased without inconvenience; for if it be so thin, that the adjacent pole of the magnet would be capable of attracting to it a new quantity of fluid, as in the case of its being thicker, it would not produce its whole effect. On the other hand, if its thickness greatly exceeded the limit to which the fluid attracted by the nearest pole might extend itself, the other fluid repelled by the same pole, passing in part into the remainder of the thickness, would produce there a magnetism similar to that of the same pole, and of which the reaction on that pole would oppose itself to the principal effect. There is therefore, a certain degree of thickness that gives, relatively to the leg of the armour, the maximum of magnetism, contrary in kind to that of the adjacent pole, and relatively to the foot the maximum of magnetism similar to that of the same pole. The artist who would direct the construction of the armour, so as to give the greatest possible perfection to the magnet, must ascertain that degree; which he can only do by trials—as it were, by continual gropings in the dark.

Kircher, in his book de Magnete, says, that the best way to arm a loadstone, is to drill a hole through it, from pole to pole, in which is to be placed a steel rod of a moderate length: this rod, he asserts, will take up more weight at the end, than the stone itself when armed in the common way: and Gassendus, as well as Cabæus, prescribe the same way of arming. But Muschenbroek found by repeated trials, that the usual armour, such as described by our author, is far preferable to Kircher's; and indeed instances are authentically recorded, in which such an armour has multiplied the natural intensity of the loadstone, a hundred, or even a hundred and fifty times.

Magnetism (*Animal.*) See Animal.

Magnetism *of the Earth*, is that which is indicated by the polarity and inclination of the magnetic needle, and has been a fruitful source of speculations.

It could not be that a phenomenon so general, and so interesting and important as the natural polarity of magnetic bodies would be long known without exciting curiosity about its cause. Accordingly the philosophers of the sixteenth century speculated much about it, and entertained a variety of opinion, if that can be called an opinion which can hardly be said to express a thought. We have in Marsigli Ficino a short notice of many of these opinions. Some maintained that the needle was directed by a certain point in the heavens, as if that were saying more than that it always pointed one way. Others, with more appearance of reasoning, ascribed the direction to vast magnetic rocks. But all this was without giving themselves the trouble of trying to ascertain what situation of such rocks would produce the direction that is observed. Fracastori was, if we mistake not, the first who thought this trouble at all necessary; and he observes very sensibly, that if those rocks are supposed to be in any place yet visited by navigators, and if they act as loadstones do (a circumstance which he says must be admitted, if we attempt to explain), the direction of the needle will be very different from what we know it to be. He therefore places them in the inaccessible polar regions, but not in the very pole. Norman, the discoverer of the dip of the mariner's needle, or of the true magnetic direction, was naturally led by his discovery to conceive the directing cause as placed in the earth; because the north point of the needle, in every part of Europe, points very far below the horizon. But although he calls the treatise in which he announces his discovery the New Attractive, he does not express himself as supposing the needle to be attracted by any point within the earth, but only that it is always directed to that point.

It is to Dr. Gilbert of Colchester that we owe the opinion now universally admitted, that magnetic polarity is a part of the constitution of this globe. Norman had, not long before, discovered, that if a steel needle be very exactly balanced on a horizontal axis, like the beam of a common balance, so that it would retain any position given it, and if to be then touched with a magnet, and placed on its axis in the magnetic meridian, it is no longer in equilibrio, but (at London) the north point of it will dip 72 or 73 degrees below the horizon. He did not, however, publish his discovery till he had obtained information how it stood in other parts of the world. The differences in the variation in different places naturally suggested the necessity of this to him. Being a maker of mariner's compasses, and teacher of navigation in London, he had the fairest opportunities that could be desired, by furnishing dipping needles to such of the navigators, his scholars, as he knew most able to give him good information. And the accounts which he received made his discovery, when announced to the world, a very complete thing; for the commanders of ships engaged in long voyages, and particularly to China, informed him that, in the vicinity of the equator, his dipping needles remained parallel to the horizon, but that in coming toward the north pole, the north end of the needle was depressed, and that the south end dipped in like manner at the Cape of Good Hope, and in the Indian Ocean; that the needle gradually approached the horizontal position as the ship approached the equator, but that in coming to the north of it at Batavia, the north point again dipped, and at Canton was several degrees below the horizon.

On these authorities, Norman boldly said that, in the equatoreal regions, the needle was horizontal, and that either end dipped regularly as it approached either pole; and that in the poles of the earth, the needle was perpendicular to the horizon. He therefore announced this as a discovery, not only singularly curious, but also of immense importance; for by means of a dipping needle the latitude of a ship at sea may be found without seeing the sun or stars.

Dr. Gilbert, comparing this position of the compass needle with the positions which he had observed small needles assume in his numerous experiments in relation to a magnet, as we have described at great length, was naturally led to the notion of the earth's being a great loadstone, or as containing one, and that this arranged the dipping, or, in general, the mariner's needle, in the same manner as he observed a great magnet arrange a small needle poised on its pivot. He therefore composed his Physiologia Nova de Magnete, et de Tellure magno Magnete; in which

he notices so many points of resemblance to the directive power of a magnet, that the point seems no longer to admit of any doubt. Dr. Gilbert's theory may be thus expressed:

All the phenomena of natural magnetism are analogous to what we should observe, if the earth were a great magnet, having its poles near the poles of the earth's equator, the north pole not far from Baffin's Bay, and the south pole nearly in the opposite part of the globe. A dipping needle, under the influence of this great magnet, must arrange itself in a plane which passes through the poles of the magnet, the position of which plane is indicated (at least nearly) by the ordinary compass needle; and it will be inclined to the horizon so much the more as we recede from the equator of the great magnet.

This opinion of Dr. Gilbert was not less ingenious than important; and if firmly established, it furnishes a complete theory of all the phenomena of magnetism. But observations were neither sufficiently numerous in the time of Dr. Gilbert, nor sufficiently accurate, to enable that great genius to assign the position of this great magnet, nor the laws of its action. The theory was chiefly founded on the phenomena of the dipping needle; phenomena which might have been unknown for ages, had the first notice of them fallen into any other hands than Norman's. They are not, like those of variation, which might be made by any sailor. They require for their exhibition a dipping needle, and the attention to circumstances which can occur only to a mathematician. A dipping needle is to this day notwithstanding all our improvements in the arts, one of the most delicate and difficult tasks that an instrument maker can take in hand, and a good one cannot be had for less than twenty guineas. We are confident that such as even Norman could make were far inferior to what are now made, and quite unfit for use at sea while the ship is under sail, although they may be tolerably exact for the observation of the dip in any port; and we presume that it was such observations only that Norman confided in. Our readers will readily conceive the difficulty of poising a needle with such a perfect coincidence of its centre of gravity and axis of motion, and perfect roundness of this axis, that it shall remain in any position that is given it. Add to this, that a grain of dust, invisible to the nicest eye, getting under one side of this axis, may be sufficient for making it assume another position. It must also be a difficult matter to preserve this delicate thing, so as that no change can happen to it. Besides, all this must be performed on a piece of tempered steel which we are certain has no magnetism. Where can this be got, or what can assure us against magnetism? Nor is there less difficulty in making the observations without great risk of error. If the needle, moveable only in a vertical plane, be not set in the plane of a magnetic meridian, it will always dip too much. At London, where the magnetic direction is inclined 73° to the horizon, if it be in a plane 20° from the magnetic meridian, it will stand almost perpendicular; for it is easy to see, by the mechanical resolution of forces, that it will take the position which brings it nearest to the true magnetic direction. This, we think, is confirmed by several of Norman's and other old observations of dip. They are much greater than they have been since found in the same places.

Mr. Daniel Bernoulli has given a very ingenious principle, by which we can make a dipping needle which will give a very accurate observation on shore; and being so easily executed, it deserves to be generally known. Let a dipping needle be made in the best manner that can be done by a workman of the place, and balanced with some care before impregnation, so that we may be certain that when touched it will take nearly the true dip. Touch it, and observe the dip. Destroy its magnetism, and then alter its balance in such a manner that, without any magnetism, it will arrange itself in the inclination of the observed dip. Now touch it again, giving it the same poles as before. It is plain that it will now approach exceedingly near indeed to the true dip, because its want of perfect equilibrium deranged it but a few degrees from the proper direction. If this second observation of the dip should differ several degrees from the first, by the inaccurate first formation of the needle, it will be proper to repeat the operation. Very rarely indeed will the third observation of the dip vary from the truth half a degree.

Mr. Bernoulli makes this simple contrivance answer the purpose of an universal instrument, in the following ingenious manner. A very light brass graduated circle fixed to one side of the needle, concentric with its axis, and the whole is balanced as nicely as possible before impregnation. A very light index is then fitted on the axis, so as to turn rather stiffly on it. This will destroy the equilibrium of the needle. If the needle has been made with perfect accuracy, and perfectly balanced, the addition of this index would cause it always to settle with the index perpendicular to the horizon, whatever degree of the circle it may chance to point at. But as this is scarcely to be expected, set the index at various degrees of the circle, and note what inclination the unmagnetic needle takes for each place of the index, and record them all in a table. Suppose, for example, that when the index is at 50, the needle inclines 46° from the horizon. If in any place we observe that the needle (rendered magnetic by lying between two strong magnets), having the index at 50, inclines 46°, we may be certain that this is the dip at that place; for the needle is not deranged by the magnetism from the position which gravity alone would give it. As we generally know something of the dip that is to be expected in any place, we must set the index accordingly. If the needle does not shew the expected dip, alter the position of the index, and again observe the dip. See whether this second position of the index and this dip form a pair which is in the table. If they do, we have got the true dip. If not, we must try another position of the index. Noticing whether the agreement of this last pair be greater or less than that of the former pair, we learn whether to change the position of the index in the same direction as before, or in the opposite. The late Dr. Robison had a dipping needle of this kind, made by a person totally unacquainted with the making of philosophical instruments. It was used at Leith, at Cronstadt in Russia, at Scarborough, and at New York, and the dip indicated by it did not in any single trial differ 1½ degrees from other trials, or from the dip observed by the finest instruments. He tried it himself in Leith Roads, in a rough sea; and does not think it inferior, either in certainty or dispatch, to a needle of the most elaborate construction. It is worthy of its most ingenious author, and of the public notice, because it can be made

for a moderate expence, and therefore may be the means of multiplying the observations of the dip, which are of immense consequence in the theory of magnetism, and for giving us an accurate knowledge of the magnetical constitution of this globe.

This knowledge is still very imperfect, owing to the want of a very numerous collection of observations of the dip. They are of more importance than those of the horizontal deviations from the meridian. All that we can say is, that the earth acts on the mariner's needle as a great loadstone would do. But we do not think that the appearances resemble the effects of what we would call a good loadstone, having the regular magnetism of two vigorous poles. The dips of the needle in various parts of the earth seem to be such as would result from the action of an extremely irregular loadstone, having its poles exceedingly diffused. The increase of the dip, as we recede from those places where the needle is horizontal, is too rapid to agree with the supposition of two poles of constipated magnetism, whether we suppose the magnetic action in the inverse simple or duplicate ratio of the distances, unless the great terrestrial magnet be of much smaller dimensions than what some other appearances oblige us to suppose. If there be four poles, as Dr. Halley imagined, it will be next to impossible to ascertain the positions of the dipping needle. It will be a tangent to one of the secondary magnetic curves, and these will be of a very intricate species. We cannot but consider the discovery of the magnetic constitution of this globe as a point of very great importance, both to the philosopher and to society. We have considered it with some care; but hitherto we have not been able to form a systematic view of the appearances which gives us any satisfaction. The well informed reader is sensible, that the attempt by means of the horizontal or variation needle is extremely tedious in its application, and is very unlikely to succeed; at the same time it must be well understood. The two dissertations by Euler, in the 13th and 22d volumes of the Memoirs of the Royal Academy at Berlin, are most excellent performances, and give a true notion of the difficulty of the subject. Yet, even in these, a circumstance is overlooked, which, for any thing we know to the contrary, may have a very great effect. If the magnetic axis be far removed from the axis of revolution, as far, for example, as Mr. Churchman places it, the magetic meridians will be (generally) much inclined to the horizon; and we shall err very far, if we suppose (as in Euler's calculus) that the dipping needle will arrange itself in the vertical plane, passing through the direction of the horizontal or variation needle; or if we imagine that the poles of the great magnet are in that plane. We even presume to think that Mr. Euler's assumption of the place of his fictitious poles (namely, where the needle is vertical), in order to obtain a manageable calculus, is erroneous. The introduction of this circumstance of inclination of the magnetic meridians to the horizon, complicates the calculation to such a degree as to make it almost unmanageable, except in some selected situations. Fortunately, they are important ones for ascertaining the places of the poles. But the investigation by the positions of the dipping needle is incomparably more simple, and more likely to give us a knowledge of a multiplicity of poles. The consideration of the magnetic curves (in the sense used in the present article), teaches us that we are not to imagine the poles immediately under those parts of the surface where the needle stands perpendicular to the horizon, nor the magnetic equator to be in those places where the needle is horizontal; a notion commonly and plausibly entertained. Unfortunately our most numerous observations of the dip are not in places where they are the most instructive. A series should be obtained, extending from New Zealand northward, across the Pacific Ocean to Cape Fairweather on the west coast of North America, and continued through that part of the continent. Another series should extend from the Cape of Good Hope, up along the west coast of Africa to the tropic of Capricorn; from thence across the interior of Africa (where it would be of great importance to mark the place of its horizontality) through Sicily, Italy, Dalmatia, the east of Germany, the Gulph of Bothnia, Lapland, and the west point of Greenland. This would be nearly a plane passing through the probable situation of the poles. Another series should be made at right angles to this, forming a small circle, crossing the other near Cape Fairweather. This would pass near Japan, through Borneo, and the west end of New Holland; also near Mexico, and a few degrees west of Easter Island. In this place, and at Borneo, the inclination of the magnetic plane to the horizon would be considerable, but we cannot find this out. It may, however, be discovered in other points of this circle, where the dip is considerable. We have not room in this short account to illustrate the advantages derived from these serieses; but the reflecting reader will be very sensible of them, if he only supposes the great magnet to be accompanied by its magnetic curves, to which the needle is always a tangent. He will then see that the first series from New Zealand to Cape Fairweather, and the second from Cape Fairweather round the other side of the globe, being in one plane, and at very different distances from the magnetic axis, must contain very instructive positions of the needle. But we still confess, that when we compare the dips already known with the variations, they appear so irreconcileable with the results of an uniform regular magnetism, that we despair of success. Every thing seems to indicate a multiplicity of poles, or, what is still more adverse to all calculation, an irregular magnetism with very diffused polarity.

Much instruction may surely be expected from the observations of the Russian academicians and their eleves, who are employed in surveying that vast empire; yet we do not meet with a single observation of the dip of the needle in all the publications of that academy, nor indeed are there many of the variation.

For want of such information, philosophers are extremely divided in their opinions of the situations of the magnetic poles of this globe. Professor Krafft, in the 17th volume of the Petersburgh Commentaries, places the north pole in lat. 70. N. and long. 23. W. from London; and the south pole in lat. 50. S. and long. 92. E.

Wilcke of Stockholm, in his indication chart (*Swed. Mem.* tom. xxx. p. 218.), places the north pole in lat. 75. N: near Baffin's Bay, in the longitude of California. The south pole is in the Pacific Ocean, in lat. 70. S.

Churchman places the north pole in lat. 59. N

and long. 135. W. a little way inland from Cape Fairweather; and the south pole in lat. 59. S. long. 165 E. due south from New Zealand.

A planisphere by the Academy of Sciences at Paris for 1786, places the magnetic equator so as to intersect the earth's equator in long. 75, and 155. from Ferro Canary Island, with an inclination of 12 degrees nearly, making it a great circle very nearly. But we are not informed on what authority this is done; and it does not accord with many observations of the dip which we have collected from the voyages of several British navigators, and from some voyages between Stockholm and Canton. Mr. Churchman has given a sketch of a planisphere with lines, which may be called parallels of the dip. Those parts of each parallel that have been ascertained by observation are marked by dots, so that we can judge of his authority for the whole construction. It is but a sketch, but gives more synoptical information than any thing yet published. The magnetic equator cuts the earth's equator in long. 15, and 195 E. from Greenwich, in an angle of nearly 17 degrees. The circles of magnetic inclination are not parallel, being considerably nearer to each other on the short meridian than on its opposite. This circumstance, being founded on observation, is one of the strongest arguments for the existence of a magnet of tolerable regularity, as the cause of all the positions of the compass needle; for such *must* be the positions of the circles of equal dip, if the axis of this magnet is far removed from the axis of rotation, and does not intersect it.

M. Biot and Arrago, supposing the magnetic equator to be a great circle of the terrestrial sphere, determine that the inclination of this plane to the astronomical equator, is equal to 12·2025 of the decimal division (10° 58′ 56″ of the common division), and its occidental node on that equator is at 133·3719 (120 2′ 5″) longitude west from Paris, that is, a little beyond the continent of America, near the Gallipagos, in the South sea; the other node is at 66.6281 (59 57′ 55″) eastward of Paris, that is to say, in the Indian seas. The points where the axis of the magnetic equator pierces the earth's surface, are, the northern point at 87·7975 (79 1′ 4″) of north latitude, and at 33·3719 (30 2′ 5″) of longitude west from Paris,—the southern point is situated in the same latitude south, and 166·6281 (149 57′ 55″) of longitude east from Paris. It is remarkable that this determination of the magnetic equator agrees almost perfectly with that given 40 years ago by Wilke and Lemonnier. Can it be by chance that these elements found so long ago should accord so well with those determined from recent observations? Or, does the inclination of the magnetic equator experience only very small variations, while all the other symptoms of terrestrial magnetism change so rapidly? Humboldt and Biot incline to the latter opinion; and this because the inclination of the magnetic needle has changed at Paris only 3° during 60 years, and at London only 2° in 200 years, while the variation of declination in the latter period has been full 30 degrees.

2. With respect to the intensity of the magnetic force in different parts of the earth, these philosophers have ascertained that it varies in different latitudes, its increase proceeding from the equator towards the poles. The needles of Humboldt's compass, which, at his departure, gave at Paris 245 oscillations in 10 minutes, gave no more in Peru than 211, and it constantly varied in the same direction; that is to say, the number of the oscillations always decreased by approaching the magnetic equator, and always increased by advancing towards the north. The difference can neither be ascribed to a diminution of magnetic force in the compass, nor to the effects of heat or of time; for after three year's residence in the warmest countries of the earth, the same compass gave again in Mexico oscillations as rapid as at Paris.

There are some anomalies, however, occasioned by local causes. Thus Biot having, in the summer of 1804, carried to the Alps the magnetic needle employed in one of his previous aërial excursions, he found that its tendency to return to the magnetic meridian was constantly stronger in those mountains than it was at Paris before his departure, and than it had been since his return. This needle, which made at Paris 83·9 oscillations in 10 minutes of time, gave oscillations as below at the places mentioned, in the same interval of 10 minutes: viz. Paris, before departure, 83·9; Turin, 87·2; on mount Genêvre, 88·2; Grenoble 87·4; Lyons, 87·3; Geneva, 86·5: Dijon, 84·5; Paris, after his return, 83.9. It appears to result from these observations that the action of the Alps has a perceptible influence on the intensity of the magnetic force. Humboldt observed analogous effects at the bottom of the Pyrenées, for instance, at Perpignan. It is not improbable that they arose from the mass of these mountains, or the ferruginous matters contained in them: but whatever may be the cause, it is hence manifest that the general action of terrestrial magnetism is sensibly modified by local circumstances, the differences of which may be perceived in places very little distant from each other.

For more on this subject see the articles Declination, Dipping *needle*, &c. and the 2d volume of Haüy's Natural Philosophy.

MAGNIFI'ABLE. *a.* (from *magnify.*) Worthy to be extolled or praised. Unusual (*Brown*).

MAGNI'FICAL. } *a.* (*magnificus*, Latin.)
MAGNI'FICE. } Illustrious; grand (*Mil.*)

MAGNI'FICENCE. *s.* (*magnificentia*, Lat.) Grandeur of appearance; splendour (*Milton*).

MAGNI'FICENT. *s.* (*magnificus*, Latin.) 1. Grand in appearance; splendid; pompous (*Addison*). 2. Fond of splendour; setting greatness to show (*Sidney*).

MAGNI'FICENTLY. *ad.* (from *magnificent.*) Pompously; splendidly (*Grew*).

MAGNI'FICO. *s.* (Italian.) A grandee of Venice (*Shakspeare*).

MA'GNIFIER. *s.* (from *magnify.*) 1. One that praises; an encomiast; an extoller (*Brown*). 2. A glass that increases the bulk of any object.

*To* MA'GNIFY. *v. a.* (*magnifico*, Latin.) 1. To make great; to exaggerate; to amplify; to extol (*Bacon*). 2. To exalt; to elevate; to raise in estimation (*Milton*). 3. To raise in pride or pretension (*Daniel*). 4. To increase the bulk of any object to the eye (*Locke*).

MA'GNITUDE. *s.* (*magnitudo*, Latin.) 1. Greatness; grandeur (*Milton*). 2. Comparative bulk (*Newton*).

MAGNOLIA. In botany, a genus of the class polyandria, order polygamia. Calyx three-leaved; petals from six to nine; capsules two-valved, imbricate; seeds berried, pennulous. Nine species; chiefly natives of America; a few of India. The following are the chief.

1. M. Grandiflora; great magnolia. Leaves perennial, oblong, a little waved; flowers large, white; petals obovate. The plant rises eighty feet high, with a straight trunk, more than two fect in diameter, with a regular head.

2. M. Nipetala. Umbrella-tree. Leaves lanceolate; outer petals hanging down, generally ten or eleven to each corol, and white of colour, and fragrant. The plant rises from fifteen to twenty feet high with a slender trunk, and soft spongy wood.

3. M. Acuminata. Spear-shaped magnolia. Leaves ovate, oblong, pointed, green on both sides: flowers twelve white petals; wood yellow.

4. M. Glauca. Small magnolia. Leaves elliptic, obtuse glaucous underneath; petals obovate. It rises from ten to fifteen inches high, with a slender stem, the wood of which is white and spongy. The flowers are terminal, white, and fragrant.

MAGNON (John), a French poet of the 17th century, was for some time an advocate at Lyons. He then became a dramatic writer, but his pieces are detestable. He formed the design of writing an Encyclopédia in verse, to make ten volumes; but this scheme was destroyed by the author's being murdered by some thieves in 1662.

MAGNUS (John), archbishop of Upsal in Sweden, was born in 1488. He greatly opposed the reformation in Sweden, but finding his efforts ineffectual, retired to Rome, where he died 1544. He wrote a History of Sweden, and a History of the Archbishops of Upsal, both in folio.

MAGNUS (Olaus), brother and successor to the preceding. He was at the Council of Trent, where he displayed considerable abilities. Being a zealous catholic, he found it necessary to quit his native country when the protestant religion was established, and died at Rome in 1655. His greatest work is a History of the Manners, Customs, and Wars, of the People of the North.

MAGNY, a town of France, in the department of Seine and Oise, 32 miles NW. of Paris. Lon. 1. 54. E. Lat. 49. 10. N.

MAGODUS, among the Romans, in a name given to those players who sometimes acted the part of men, and sometimes of women: the word is derived from μαγος, *magic*, and ωδος *singer*, and properly denotes those players who performed extraordinary feats and gestures.

MAGOPHONIA, formed from μαγος, *magus*, and φονος, *slaughter*, the name of a feast among the ancient Persians, held in memory of the expulsion of the Magians.

MAGOT, in mastiology. See SIMIA.

MAGPIE, in ornithology. See CORVUS.

MAHALEB. In botany, a name for one or two of the species of PRUNUS, which see.

MAHERNIA. In botany, a genus of the class pentandria, order pentagynia. Calyx five-toothed; petals five; nectaries five, united at the base, inversely heart-shaped, placed under the filaments; capsule five-celled. Nine species, all shrubs or shrubby plants of the Cape, and some of them very beautiful.

MAHIE, or *Bread-fruit-tree*. See ARTOCARPUS.

MAHO-TREE. A name given by some writers to one or two species of HIBISCUS; which see.

MAHOGANY-TREE. See SWEITENIA.

MAHOMET, or MOHAMMED, styled the *Impostor*, was born in the reign of Anushirwan the Just, emperor of Persia, about the end of the 6th century of the Christian æra. He came into the world under some disadvantages. His father Abd'allah was a younger son of Abd'almotalleb; and dying very young, and in his father's lifetime, left his widow and infant son in very mean circumstances, his whole substance consisting but of five camels and one Ethiopian she-slave. Abd'almotalleb was therefore obliged to take care of his grandchild Mahomet; which he not only did during his life, but at his death enjoined his eldest son Abu Taleb, who was brother to Abd'allah by the same mother, to provide for him for the future: which he very affectionately did, and instructed him in the business of a merchant, which he followed; and to that end he took him into Syria when he was but 13. He afterwards recommended him to Khadijah, a noble and rich widow, for her factor; in whose service he behaved himself so well, that by making him her husband she soon raised him to an equality with the richest in Mecca.

After he began by this advantageous match to live at his ease, it was, that he formed the scheme of establishing a new religion, or, as he expressed it, of replanting the only true and ancient one professed by Adam, Noah, Abraham, Moses, Jesus, and all the prophets, by destroying the gross idolatry into which the generality of his countrymen had fallen, and weeding out the corruptions and superstitions which the latter Jews and Christians had, as he thought, introduced into their religion, and reducing it to its original purity, which consisted chiefly in the worship of one only God.

Before he made any attempt abroad, he rightly judged that it were necessary for him to begin with the conversion of his own household. Having therefore retired with his family, as he had done several times before, to a cave in mount Hara, he there opened the secret of his mission to his wife Khadijah; and acquainted her, that the angel Gabriel had just before appeared to

*Moræa.*

*M. ciliata.*

*Ciliate-leaved Moræa*

*Magnolia.*

*M. fuscata.*

*Brown-stalked Magnolia.*

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had just before appeared to him, and told him that he was appointed the apostle of God: he also repeated to her a passage which he pretended had been revealed to him by the ministry of the angel, with those other circumstances of this first appearance, which are related by the Mahometan writers. Khadijah, or Cadiga, received the news with great joy; swearing by him in whose hands her soul was, that she trusted he would be the prophet of his nation; and immediately communicated what she had heard to her cousin Warakah Ebn Nawfal, who, being a Christian, could write in the Hebrew character, and was tolerably well versed in the scriptures; and he as readily came into her opinion, assuring her that the same angel who had formerly appeared unto Moses was now sent to Mahomet. The first overture the prophet made was in the month of Ramadan, in the 40th year of his age, which is therefore usually called the year of his mission.

Encouraged by so good a beginning, he resolved to proceed vigorously, though cautiously, in his bold design. Withdrawing himself, therefore, from the society of the dissipated, he assumed a character of superior sanctity, and every morning retiring to a solitary cave near Mecca, he devoted the day to abstemiousness, and holy meditation. Well tutored in the arts of hypocrisy, he, in his 40th year, assumed the title of the apostle of God, and gradually increased his fame and his followers by the aid of pretended visions. Though his doctrines were embraced at first only by his wife Cadiga, and eight other dependants, yet in the fifth year of his mission his followers increased to the number of 39. Enemies, however, were not wanting to oppose him; and while some heaped on him the odious appellations of an impostor and magician, others foresaw his rapid strides to the sovereign power. Mahomet, notwithstanding, overcame all opposition: in proclaiming himself the prophet appointed by God, to propagate a new religion, he flattered the prejudices of his nation; and among a people whose climate is exposed to a scorching sun, he allured the imagination by painting rivers of cooling waters, shaded retreats, luxurious fruits, and all the sensual delights of the immaculate houris, for the happy proselytes of his doctrine; while he denounced against his enemies, not only dreadful visitations in the present life, and exclusion from paradise, but a habitation in a continual fire, surrounded with a black hot salt smoke, without the ability of breathing any but the most noxious heated air, and of drinking the most nauseous water. This was not announced as the figurative language of an impostor, but the prophet delivered them as the command of God, and produced occasionally various chapters, which had been copied from the archives of heaven, brought down by the angel Gabriel. Whatever difficulties arose, were quickly reremoved by the condescension of the angel, and a fresh revelation came from heaven on every trying occasion, to support the character of Mahomet. When the proselytes demanded miracles from a prophet who called himself superior to Moses and to Christ, the impostor declared, that God had sent Moses and Jesus with miracles, and yet that men would not obey them, and that therefore he had sent Mahomet in the last place, without miracles, to force them by the power of the sword to do his will. Thus commissioned by heaven, he refused longer to answer questions, and when he found himself exposed to danger at Mecca, he left the city, and retired to Medina, where his doctrines found a more friendly reception. This event, which happened about the 16th July, 622, forms the celebrated era of the Mahometans, called the hegira, or flight from Mecca. At Medina, the prophet erected his standard; and as for 13 years before he had endeavoured to spread his doctrines by persuasion, he now propagated them by the sword. The two first years were employed in predatory excursions against caravans; but after exterminating several of the tribes of Arabia, he at last marched against Mecca, and after a battle, granted a truce to his enemies, by which he not only confirmed his power as a prophet, but assumed the title of sovereign over his nation. He next turned his arms against Caibar, and after he had taken it by storm, he fixed his abode in the house of one of the principal men of the place, whose daughter placed before him a poisoned shoulder of mutton. The poison was so powerful, that Basher, one of his attendants, died immediately; but the impostor himself, though he only tasted the meat, never fully recovered his strength, and perished three years after in consequence of the fatal food. The accident might have shaken the faith of his followers, as the woman declared, that if he were a prophet, he would have known that the meat was poisoned; but Mahomet enforced the tenets of predestination in his favour. His next expedition was against Mecca, which had broken the truce, and though defeated in one battle, he secured the victory; and so exerted his power over the neighbouring tribes, that in the 10th year of the hegira his empire and his religion had enslaved the whole of Arabia. As he had recommended to his followers a pilgrimage to Mecca, he himself performed it, whilst his officers were employed around in the destruction of heathen temples; and after instructing the various devotees which flocked from all parts of Arabia, he returned to Medina. It was his last journey; he soon after fell sick, the poison which three years before he had taken began to operate more powerfully, and after a confinement of 13 days, the prophet died, A. D. 632, aged 62. He was buried in the same place where he died, in the chamber of the most beloved of his wives, at Medina, where his remains are still preserved, and not in an iron coffin suspended in the air, between two loadstones, as vulgarly reported. By Cadiga, Mahomet had six children, one of whom only grew up, Fatima, but survived him only 60 days. After the death of Cadiga, the prophet, who had hitherto been satisfied with one wife, married several, and kept besides a great number of concubines. By none of his wives, who, ac-

cording to some, were 15, and according to others 21, he left issue; but of the ten who survived him, Ayesha the daughter of Abubecker, his successor, was the most beloved. So great was the influence of this celebrated female, that she prevented Ali, the husband of Fatima, from succeeding to the throne, because he had revealed her incontinence to the prophet. The success of Mahomet's imposture during his life-time is not more astonishing than the permanent establishment which his doctrines have maintained over so great a part of the globe, during near 1200 years. The Koran, in which are contained the tenets of his religion, is a compound of sublime truths, of incredible tales, and ludicrous events, delivered in a pleasing, elegant, and nervous style. That Mahomet, who was illiterate, should compose a book, deservedly esteemed, a standard of elegance, without divine assistance, was considered as impossible among his followers, and therefore they believed it to be the work of God. Mahomet, however, was assisted in the framing of his work by a Persian Jew, who was well versed in the learning of his country, and the laws of Moses; and by a christian monk of the nestorian sect. To the labours of these two men he was indebted for the composition of the koran, and hence we trace the frequent allusions to the mosaical institutions, and the history of Christ. Thus he was enabled to impose upon his followers, by interpreting various passages of the scriptures in his own favour, and by accusing the Jews and Christians of mutilation and interpolation, where he thought he found his character obscurely delineated. By calling himself the comforter whom Christ had promised to his disciples, he mightily prevailed with the credulous; and every true Mussulman believes, that several copies of the New Testament still contain an original text, which expressly foretels the coming of a prophet of the name of Mahomet. As Mahomet was subject to the falling sickness, he persuaded his disciples, that in those moments of suspended animation he accompanied the angel Gabriel in various journeys; and that borne by the celestial beast Alborak, he ascended up into the highest heavens, where he conversed with the Almighty, and received communications with respect to the laws and the religion with which he was to bless the earth. In these conferences, he saw the most renowned prophets of old; he spoke to Elijah, Moses, and Christ, and was honoured by the Creator himself with privileges above the rest of mankind. The koran has been elegantly translated into English, by Sale, in 2 vols. 4to. and 2 vols. 8vo.

MAHOMET I. emperor of the Turks, was son of Bajazet I. and succeeded 1413. He was a brave and politic monarch. He restored to its ancient glory the power of the Ottomans, and conquered Cappadocia, Servia, Wallachia, and other provinces. He was at peace with Manuel Palæologus, to whom he restored some of his provinces, and died at Adrianople, of a bloody flux, 1421, aged 47.

MAHOMET II. emperor of the Turks, succeeded his father Amurath, 1451. His reign was begun with preparations for war, Constantinople was besieged, and he conveyed over the land some of his gallies into the harbour, which the Greeks had shut up against the invaders. Constantinople yielded to the conqueror, 1453, and in her fall poured forth her fugitive philosophers and learned men to revive literature in the western world. Mahomet, by his victories, deserved the name of great, and the appellation of grand signior, which he assumed, and which has descended to his successors. After subduing two empires, 12 tributary kingdoms, and 200 towns, he was preparing the subjugation of Italy, when a colic proved fatal to him, 1481, after a reign of 31 years. His death was the cause of universal rejoicing over the christian world, whose religion he had sworn to exterminate, for the tenets of Mahomet. Though a warrior, Mahomet was cruel and tyrannical, and that he might glut his rage, his lust, and his ambition, neither rank, nor sex, nor age, were spared.

MAHOMET III. succeeded his father Amurath III. 1595. He began his reign by ordering 19 of his brothers to be strangled, and 10 of his father's wives to be drowned. He made war against Rodolphus II. and invaded Hungary with an army of 200,000 men; but his progress was checked by Maximilian, the emperor's brother, who would have obtained a decisive victory, had not his troops abandoned themselves to pillage. Mahomet, obliged to retire from Hungary, and the neighbouring provinces, buried himself in the indolence of his seraglio. He died of the plague, 1603, aged 39.

MAHOMET IV. succeeded 1649, on the death of his father Ibrahim I. He pursued the war with the Venetians, and after reducing Candia, with the loss of 200,00 men, he invaded Poland. His arms proved victorious, but the disgrace was wiped off by the valour of Sobieski, who the next year routed his enemies at the battle of Choezin. Vienna would have fallen in the next war, if Sobieski had not hastened to its relief, and destroyed the Turkish army. The blow was followed by the union of the emperor, the king of Poland, and the Venetians; and Mahomet, every where defeated, was deposed 1687, and sent to prison. He died in his confinement, 1691.

MAHOMET V. son of Mustapha II. succeeded in 1730. His janissaries expected from him the recovery of the conquered provinces, but he lost Georgia and Armenia, which were conquered by Kouli-Khan. Mahomet died in 1754.

MAHOMETANISM, or MAHOMETISM, the system of religion broached by Mahomet, and still adhered to by his followers. See MAHOMET, and ALCORAN.

Mahometanism is professed by the Turks, Persians, and several nations among the Africans, and many among the East Indians.

The Mahometans divide their religion into two general parts, faith and practice: of which the first is divided into six distinct branches: belief in God, in his angels, in his scriptures, in his prophets, in the resurrection and final judgment, and in God's absolute decrees. The points relating to practice

ate, prayer, with washings, &c. alms, fasting, pilgrimage to Mecca, and circumcision.

I. *Of the Mahometan Faith.*—1. That both Mahomet, and those among his followers who are reckoned orthodox, had and continue to have just and true notions of God and his attributes, appears so plain from the Koran itself, and all the Mahometan divines, that it would be loss of time to refute those who suppose the God of Mahomet to be different from the true God, and only a fictitious deity or idol of his own creation.

2. The existence of angels, and their purity are absolutely required to be believed in the Koran; and he is reckoned an infidel who denies there are such beings, or hates any of them, or asserts any distinction of sexes among them. They believe them to have pure and subtle bodies, created of fire; that they neither eat nor drink, nor propagate their species; that they have various forms and offices, some adoring God in different postures, others singing praises to him, or interceding for mankind. They hold that some of them are employed in writing down the actions of men; others in carrying the throne of God, and other services.

The four angels whom they look on as more eminently in God's favour, and often mention on account of the offices assigned them, are Gabriel, to whom they give several titles, particularly those of the holy spirit, and the angel of revelations, supposing him to be honoured by God with a greater confidence than any other, and to be employed in writing down the divine decrees; Michael, the friend and protector of the Jews; Azrael, the angel of death, who separates men's souls from their bodies; and Israsil, whose office it will be to sound the trumpet at the resurrection. The Mahometans also believe, that two guardian angels attend on every man, to observe and write down his actions, being changed every day, and therefore called al Moakkibat, or "the angels who continually succeed one another."

The devil, whom Mahomet names Eblis, from his despair, was once one of those angels who are nearest to God's presence, called Azazil; and fell, according to the doctrine of the Koran, for refusing to pay homage to Adam at the command of God.

Besides angels and devils, the Mahometans are taught by the Koran to believe an intermediate order of creatures, which they call jin or genii, created also of fire, but of a grosser fabric than angels, since they eat and drink, and propagate their species, and are subject to death. Some of these are supposed to be good and others bad, and capable of future salvation or damnation, as men are; whence Mahomet pretended to be sent for the conversion of genii as well as men.

3. As to the Scriptures, the Mahometans are taught by the Koran, that God, in divers ages of the world, gave revelations of his will in writing to several prophets, the whole and every one of which it is absolutely necessary for a good Moslem to believe. The number of these sacred books was, according to them, 104. Of which 10 were given to Adam, 50 to Seth, 30 to Edris or Enoch, 10 to Abraham; and the other four, being the Pentateuch, the Psalms, the Gospel, and the Koran, were successively delivered to Moses, David, Jesus, and Mahomet; which last being the seal of the prophets, those revelations are now closed, and no more are to be expected. All these divine books, except the four last, they agree to be now entirely lost, and their contents unknown; though the Sabians have several books which they attribute to some of the antediluvian prophets. And of those four, the Pentateuch, Psalms, and Gospel, they say, have undergone so many alterations and corruptions, that, though there may possibly be some part of the true word of God therein, yet no credit is to be given to the present copies in the hands of the Jews and Christians. The Mahometans have also a gospel in Arabic, attributed to St. Barnabas; wherein the history of Jesus Christ is related in a manner very different from what we find in the true gospels, and correspondent to those traditions which Mahomet has followed in his Koran. Of this gospel the Moriscoes in Africa have a translation in Spanish; and there is, in the library of prince Eugene of Savoy, a manuscript of some antiquity, containing an Italian translation of the same gospel; made, it is to be supposed, for the use of renegades. This book appears to be no original forgery of the Mahometans; though they have, no doubt, interpolated and altered it since, the better to serve their purpose; and in particular, instead of the paraclete, or comforter, they have in this apocryphal gospel inserted the word periclyte, that is, the famous, or illustrious; by which they pretend their prophet was foretold by name, that being the signification of Mohammed in Arabic: and this they say to justify that passage of the Koran, where Jesus Christ is formally asserted to have foretold his coming, under his other name of Ahmed, which is derived from the same root as Mohammed, and of the same import. From these, or some other forgeries of the same stamp, it is that the Mahometans quote several passages, of which there are not the least footsteps in the New Testament.

4. The number of the prophets which have been from time to time sent by God into the world amounts to no less than 224,000, according to one Mahometan tradition; or to 124,000, according to another; among whom 313 were apostles, sent with special commissions to reclaim mankind from infidelity and superstition; and six of them brought new laws or dispensations, which successively abrogated the preceding; these were Adam, Noah, Abraham, Moses, Jesus, and Mahomet. All the prophets in general the Mahometans believe to have been free from great sins and errors of consequence, and professors of one and the same religion, that is, Islam, notwithstanding the different laws and institutions which they observed. They allow of degrees among them, and hold some of them to be more excellent and honourable than others. The first place they give to the revealers and establishers of new dispensations, and the next to the apostles.

In this great number of prophets they not only reckon divers patriarchs and persons named in scripture, but not recorded to have been prophets, (wherein the Jewish and Christian writers have sometimes led the way) as Adam, Seth, Lot, Ishmael, Nun, Joshua, &c. and introduce some of them under different names, as Enoch, Heber, and Jethro, who are called, in the Koran, Edris, Hud, and Shoaib; but several others whose very names do not appear in scripture (though they endeavour to find some persons there to fix them on), as Saleh, Khedr, Dhu'lkefl, &c.

5. The belief of a general resurrection and a future judgment.

When a corpse is laid in the grave, they say he is received by an angel, who gives him notice of the coming of the two examiners; who are two black livid angels, of a terrible appearance, named Monker and Nakir. These order the dead person to sit upright; and examine him concerning his

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faith, as to the unity of God, and the mission of Mahomet: if he answer rightly, they suffer the body to rest in peace, and it is refreshed by the air of paradise; but if not, they beat him on the temples with iron maces, till he roars out for anguish so loud, that he is heard by all from east to west, except men and genii. They then press the earth on the corpse, which is gnawed and stung till the resurrection by 99 dragons, with seven heads each; or, as others say, their sins will become venomous beasts, the grievous ones stinging like dragons, the smaller like scorpions, and the others like serpents; circumstances which some understand in a figurative sense.

As to the soul, they hold that, when it is separated from the body by the angel of death, who performs his office with ease and gentleness towards the good, and with violence towards the wicked, it enters into that which they call al berzakh, or the interval between death and the resurrection. If the departed person was a believer, they say, two angels meet it, who convey it to heaven, that its place there may be assigned, according to its merit and degree. For they distinguish the souls of the faithful into three classes: the first of prophets, whose souls are admitted into paradise immediately; the second of martyrs, whose spirits, according to a tradition of Mahomet, rest in the crops of green birds, which eat of the fruits and drink of the rivers of paradise; and the third of other believers, concerning the state of whose souls before the resurrection there are various opinions.

Though some among the Mahometans have thought that the resurrection will be merely spiritual, and no more than the returning of the soul to the place whence it first came (an opinion defended by Ebn Sina, and called by some the opinion of the philosophers); and others, who allow man to consist of body only, that it will be merely corporeal; the received opinion is, that both body and soul will be raised: and their doctors argue strenuously for the possibility of the resurrection of the body, and dispute with great subtility concerning the manner of it. But Mahomet has taken care to preserve one part of the body, whatever becomes of the rest, to serve for a basis of the future edifice, or rather a leaven for the mass which is to be joined to it. For he taught, that a man's body was entirely consumed by the earth, except only the bone called al ajb, which we name the os coccygis, or rumpbone; and that as it was the first formed in the human body, it will also remain uncorrupted till the last day, as a seed from whence the whole is to be renewed; and this, he said, would be effected by a forty years rain, which God should send, and which would cover the earth to the height of 12 cubits, and cause the bodies to sprout forth like plants. Herein, also, is Mahomet beholden to the Jews; who say the same things of the bone Luz, excepting that what he attributes to a great rain, will be effected, according to them, by a dew impregnating the dust of the earth.

The time of the resurrection the Mahometans allow to be a perfect secret to all but God alone; the angel Gabriel himself acknowledging his ignorance in this point, when Mahomet asked him about it. However, they say, the approach of that day may be known from certain signs which are to precede it. These signs they distinguish into two sorts, the lesser and the greater; which, however, we cannot detail here.

The greater signs, according to their doctrine, are to precede the resurrection, but still leave the hour of it uncertain; for the immediate sign of its being come will be the first blast of the trumpet, which they believe will be sounded three times. The first they call the blast of consternation; at the hearing of which all creatures in heaven and earth shall be struck with terror, except those whom God shall please to exempt from it. The effects attributed to this first sound of the trumpet are very wonderful: for they say the earth will be shaken, and not only all buildings, but the very mountains levelled; that the heavens shall melt, the sun be darkened, the stars fall, on the death of the angels, who, as some imagine, hold them suspended between heaven and earth; and the sea shall be troubled and dried up, or, according to others, turned into flames, the sun, moon, and stars being thrown into it: the Koran, to express the greatness of the terror of that day, adds, that women who give suck shall abandon the care of their infants, and even the she camels which have gone 10 months with young (a most valuable part of the substance of that nation) shall be utterly neglected. A farther effect of this blast will be that concourse of beasts mentioned in the Koran, though some doubt whether it be to precede the resurrection or not. They who suppose it will precede, think that all kinds of animals, forgetting their respective natural fierceness and timidity, will run together into one place, being terrified by the sound of the trumpet and the sudden shock of nature.

The Mahometans believe that this first blast will be followed by a second, which they call the blast of exinanition; by which all creatures both in heaven and earth shall die or be annihilated, except those which God shall please to exempt from the common fate; and this, they say, shall happen in the twinkling of an eye, nay in an instant; nothing surviving except God alone, with paradise and hell, and the inhabitants of those two places, and the throne of glory. The last who shall die will be the angel of death.

Forty years after this will be heard the blast of resurrection, when the trumpet shall be sounded the third time by Israsil, who, together with Gabriel and Michael, will be previously restored to life, and, standing on the rock of the temple of Jerusalem, shall, at God's command, call together all the dry and rotten bones, and other dispersed parts of the bodies, and the very hairs to judgment. This angel having, by the divine order, set the trumpet to his mouth, and called together all the souls from all parts, will throw them into his trumpet, from whence, on his giving the last sound, at the command of God, they will fly forth like bees, and fill the whole space between heaven and earth, and then repair to their respective bodies, which the opening earth will suffer to arise; and the first who shall so arise, according to a tradition of Mahomet, will be himself. For this birth the earth will be prepared by the rain above-mentioned, which is to fall continually for 40 years, and will resemble the seed of a man, and be supplied from the water under the throne of God, which is called living water; by the efficacy and virtue of which the dead bodies shall spring forth from their graves as they did in their mother's womb, or as corn sprouts forth by common rain, till they become perfect; after which breath will be breathed into them, and they will sleep in their sepulchres till they are raised to life at the last trumpet.

When those who have risen shall have waited the limited time, the Mahometans believe God will at length appear to judge them; Mahomet undertaking the office of intercessor, after it shall have

been declined by Adam, Noah, Abraham, and Jesus, who shall beg deliverance only for their own souls. They say, that on this solemn occasion God will come in the clouds surrounded by angels, and will produce the books wherein the actions of every person are recorded by their guardian angels, and will command the prophets to bear witness against those to whom they have been respectively sent. Then every one will be examined concerning all his words and actions uttered and done by him in this life; not as if God needed any information in these respects, but to oblige the person to make public confession and acknowledgment of God's justice. The particulars, of which they shall give an account, as Mahomet himself enumerated them, are, of their time, how they spent it; of their wealth, by what means they acquired it, and how they employed it; of their bodies, wherein they exercised them; of their knowledge and learning, what use they made of them. To the questions we have mentioned, each person shall answer, and make his defence in the best manner he can, endeavouring to excuse himself by casting the blame of his evil deeds on others; so that a dispute shall arise even between the soul and the body, to which of them their guilt ought to be imputed: the soul saying, "O Lord, my body I received from thee; for thou createdst me without a hand to lay hold with, a foot to walk with, an eye to see with, or an understanding to apprehend with, till I came and entered into this body; therefore punish it eternally, but deliver me." The body, on the other side, will make this apology: "O Lord, thou createst me like a stock of wood, having neither hand that I could lay hold with, nor foot that I could walk with, till this soul, like a ray of light, entered into me, and my tongue began to speak, my eye to see, and my foot to walk: therefore punish it eternally, but deliver me." But God will propound to them the following parable of the blind man and the lame man, which, as well as the preceding dispute, was borrowed by the Mahometans from the Jews. A certain king, having a pleasant garden, in which were ripe fruits, set two persons to keep it, one of whom was blind, and the other lame; the former not being able to see the fruit, nor the latter to gather it: the lame man, however, seeing the fruit, persuaded the blind man to take him upon his shoulders, and by that means he easily gathered the fruit, which they divided between them. The lord of the garden coming some time after, and inquiring after his fruit, each began to excuse himself; the blind man said he had no eyes to see with; and the lame man, that he had no feet to approach the trees. But the king, ordering the lame man to be set on the blind, passed sentence on and punished them both. And in the same manner will God deal with the body and the soul. As these apologies will not avail on that day, so it will be in vain for any one to deny his evil actions; since men and angels, and his own members, nay, the very earth itself, will be ready to bear witness against him.

At this examination, they also believe, that each person will have the book wherein all the actions of his life are written delivered to him: which books the righteous will receive into their right hand, and read with great pleasure and satisfaction; but the ungodly will be obliged to take them, against their wills, in their left, which will be bound behind their backs, their right hand being tied up to their necks.

To show the exact justice which will be observed on this great day of trial, the next thing they describe is the balance, wherein all things shall be weighed. They say it will be held by Gabriel; and that it is of so vast a size, that its two scales, one of which hangs over paradise, and the other over hell, are capacious enough to contain both heaven and hell. Though some are willing to understand what is said in the Koran concerning this balance allegorically, and only as a figurative representation of God's equity; yet the more ancient and orthodox opinion is, that they are to be taken literally; and since words and actions, being mere accidents, are not capable of being themselves weighed, they say that the books wherein they are written will be thrown into the scales, and according as those wherein the good or evil actions are recorded shall preponderate, sentence will be given: those whose balances laden with good works shall be heavy, will be saved; but those whose balances are light, will be condemned. Nor will any one have cause to complain that God suffers any good action to pass unrewarded, because the wicked for the good they do have their reward in this life, and therefore can expect no favour in the next.

This examination being past, and every one's works weighed in a just balance, that mutual retaliation will follow, according to which every creature will take vengeance one of another, or have satisfaction made them for the injuries which they have suffered. And, since there will then be no other way of returning like for like, the manner of giving this satisfaction will be by taking away a proportional part of the good works of him who offered the injury, and adding it to those of him who suffered it. Which being done, if the angels (by whose ministry this is to be performed) say, "Lord, we have given to every one his due, and there remaineth of this person's good works so much as equalleth the weight of an ant," God will, of his mercy, cause it to be doubled unto him, that he may be admitted into paradise; but if, on the contrary, his good works be exhausted, and there remain evil works only, and there be any who have not yet received satisfaction from him, God will order that an equal weight of their sins be added unto his, that he may be punished for them in their stead, and he will be sent to hell laden with both. This will be the method of God's dealing with mankind. As to brutes, after they shall have likewise taken vengeance of one another, he will command them to be changed into dust; wicked men being reserved to more grievous punishment, so that they shall cry out, on hearing this sentence passed on the brutes, "Would to God that we were dust also!" As to the genii, many Mahometans are of opinion, that such of them as are true believers will undergo the same fate as the irrational animals, and have no other reward than the favour of being converted into dust: and for this they quote the authority of their prophet.

The trials being over, and the assembly dissolved, the Mahometans hold, that those who are to be admitted into paradise will take the right-hand way, and those who are destined to hell-fire will take the left; but both of them must first pass the bridge called in Arabic al Sirat, which they say is laid over the midst of hell, and describe to be finer than a hair, and sharper than the edge of a sword; so that it seems very difficult to conceive how any one shall be able to stand upon it; for which reason, most of the sect of the Motaz-

alites reject it as a fable; though the orthodox think it a sufficient proof of the truth of this article, that it was seriously affirmed by him who never asserted a falsehood, meaning their prophet: who, to add to the difficulty of the passage, has likewise declared, that this bridge is beset on each side with briars and hooked thorns: which will however be no impediment to the good; for they shall pass with wonderful ease and swiftness, like lightning, or the wind, Mahomet and his Moslems leading the way; whereas the wicked, what with the slipperiness and extreme narrowness of the path, the entangling of the thorns, and the extinction of the light which directed the former to paradise, will soon miss their footing, and fall down headlong into hell, which is gaping beneath them.

As to the punishment of the wicked, the Mahometans are taught, that hell is divided into seven stories or apartments, one below another, designed for the reception of as many distinct classes of the damned.

The first, which they call Jehennam, they say, will be the receptacle of those who acknowledge one God, that is, the wicked Mahometans: who after having there been punished according to their demerits, will at length be released. The second, named Ladha, they assign to the Jews: the third, named al Hotama, to the Christians; the fourth named al Sair, to the Sabians; the fifth, named Sakar, to the Magians; the sixth, named al Jahim, to the idolaters; and the seventh, which is the lowest and worst of all, and is called al Hawyet, to the hypocrites, or those who outwardly professed some religion, but in their hearts were of none. Over each of these apartments they believe there will be set a guard of angels, 19 in number; to whom the damned will confess the just judgment of God, and beg them to intercede with him for some alleviation of their pain, or that they may be delivered by being annihilated.

Mahomet has, in his Koran and traditions, been very exact in describing the various torments of hell, which, according to him, the wicked will suffer both from intense heat and excessive cold. We shall, however, enter into no detail of them here; but only observe, that the degrees of these pains will also vary in proportion to the crimes of the sufferer, and the apartment he is condemned to; and that he who is punished the most lightly of all will be shod with shoes of fire, the fervour of which will cause his skull to boil like a cauldron. The condition of these unhappy wretches, as the same prophet teaches, cannot be properly called either life or death; and their misery will be greatly increased by their despair of being ever delivered from that place, since, according to that frequent expression in the Koran, they must remain therein for ever. It must be remarked, however, that the infidels alone will be liable to eternity of damnation; for the Moslems, or those who have embraced the true religion, and have been guilty of heinous sins, will be delivered thence after they shall have expiated their crimes by their sufferings. The time which these believers shall be detained there, according to a tradition handed down from their prophet, will not be less than 900 years, nor more than 7000. And, as to the manner of their delivery, they say that they shall be distinguished by the marks of prostration on those parts of their bodies with which they used to touch the ground in prayer, and over which the fire will therefore have no power; and that, being known by this characteristic, they will be released by the mercy of God, at the intercession of Mahomet and the blessed: whereupon those who shall have been dead will be restored to life, as has been said, and those whose bodies shall have contracted any sootiness or filth from the flames and smoke of hell, will be immersed in one of the rivers of paradise, called the river of life, which will wash them whiter than pearls.

The righteous, as the Mahometans are taught to believe, having surmounted the difficulties, and passed the sharp bridge above mentioned, before they enter paradise, will be refreshed by drinking at the pond of their prophet, who describes it to be an exact square of a month's journey in compass; its water, which is supplied by two pipes from Al Cawthar, one of the rivers of paradise, being whiter than milk or silver, and more odoriferous than musk, with as many cups set around it as there are stars in the firmament; of which water whoever drinks will thirst no more for ever. This is the first taste which the blessed will have of their future and now near approaching felicity.

Though paradise be so very frequently mentioned in the Koran, yet it is a dispute among the Mahometans whether it be already created, or to be created hereafter; Motazalites and some other sectaries asserting, that there is not at present any such place in nature, and that the paradise which the righteous will inhabit in the next life will be different from that from which Adam was expelled. However, the orthodox profess the contrary, maintaining that it was created even before the world, and describe it, from their prophet's traditions, in the following manner:

They say it is situated above the seven heavens (or in the seventh heaven), and next under the throne of God; and, to express the amenity of the place, tell us, that the earth of it is of the finest wheat flour, or of the purest musk, or, as others will have it, of saffron: that its stones are pearls and jacinths, the walls of its buildings enriched with gold and silver; and that the trunks of all its trees are of gold, among which the most remarkable is the tree call Tuba, or the tree of happiness. Concerning this tree, they fable, that it stands in the palace of Mahomet, though a branch of it will reach to the house of every true believer; that it will be laden with pomegranates, grapes, dates, and other fruits, of surprising bigness, and of tastes unknown to mortals. So that if a man desire to eat of any particular kind of fruit, it will immediately be presented him; or, if he choose flesh, birds ready dressed will be set before him, according to his wish. They add, that the boughs of this tree will spontaneously bend down to the hand of the person who would gather of its fruits, and that it will supply the blessed not only with food, but also with silken garments, and beasts to ride on ready saddled and bridled, and adorned with rich trappings, which will burst forth from its fruits; and that this tree is so large, that a person, mounted on the fleetest horse, would not be able to gallop from one end of its shade to the other in 100 years.

As plenty of water is one of the greatest additions to the pleasantness of any place, the Koran often speaks of the rivers of paradise as a principal ornament thereof: some of these rivers,

they say, flow with water, some with milk, some with wine, and others with honey; all taking their rise from the root of the tree Tuba.

But all these glories will be eclipsed by the resplendent and ravishing girls of paradise, called from their large black eyes Hur al oyun, the enjoyment of whose company will be a principal felicity of the faithful. These, they say, are created, not of clay, as mortal women are, but of pure musk; being, as their prophet often affirms in his Koran, free from all natural impurities, defects, and inconveniences incident to the sex, of the strictest modesty, and secluded from public view in pavilions of hollow pearls, so large, that as some traditions have it, one of them will be no less than four parasangs (or, as others say, 60 miles) long, and as many broad.

The name which the Mahometans usually give to this happy mansion is al Jannat, or the garden; and sometimes they call it, with an addition, Jannat al Ferdaws, the garden of paradise; Jannat Aden, the garden of Eden, (though they generally interpret the word Eden, not according to its acceptation in Hebrew, but according to its meaning in their own tongue, wherein it signifies a settled or perpetual habitation;) Jannat al Mawa, the garden of abode; Jannat al Naim, the garden of pleasure; and the like: by which several appellations some understand so many different gardens, or at least places of different degrees of felicity (for they reckon no less than 100 such in all), the very meanest whereof will afford its inhabitants so many pleasures and delights, that one would conclude they must even sink under them, had not Mahomet declared that, in order to qualify the blessed for a full enjoyment of them, God will give to every one the abilities of 100 men.

6. God's absolute decree and predestination both of good and evil. The orthodox doctrine is, that whatever hath or shall come to pass in this world, whether it be good, or whether it be bad, proceedeth entirely from the divine will, and is irrevocably fixed and recorded from all eternity in the preserved table: God having secretly predetermined not only the adverse and prosperous fortune of every person in this world, in the most minute particulars, but also his faith or infidelity, his obedience or disobedience, and consequently his everlasting happiness or misery after death; which fate or predestination it is not possible by any foresight or wisdom to avoid.

Of this doctrine Mahomet makes great use in his Koran for the advancement of his designs; encouraging his followers to fight without fear and even desperately, for the propagation of their faith, by representing to them, that all their caution could not avert their inevitable destiny, or prolong their lives for a moment; and deterring them from disobeying or rejecting him as an impostor, by setting before them the danger they might thereby incur of being, by the just judgment of God, abandoned to seduction, hardness of heart, and a reprobate mind, as a punishment for their obstinancy.

II. *Religious Practice.*—Of this we shall only mention here the pilgrimage to Mecca, which is so necessary a point of practice, that, according to a tradition of Mahomet, he who dies without performing it may as well die a Jew or a Christian; and the same is expressly commanded in the Koran.

The temple of Mecca stands in the midst of the city, and is honoured with the title of Masjad al alharam, i. e. the sacred or inviolable temple. What is principally reverenced in this place, and gives sanctity to the whole, is a square stone building, called the CAABA; (see that article).

To this temple every Mahometan, who has health and means sufficient, ought, once at least in his life, to go on pilgrimage; nor are women excused from the performance of this duty. The pilgrims meet at different places near Mecca, according to the different parts from whence they come, during the months of Shawal and Dhu'lkaada, being obliged to be there by the beginning of Dhu'lhajja; which month, as its name imports, is peculiarly set apart for the celebration of this solemnity.

At the place above mentioned the pilgrims properly commence such; when the men put on the Ibram or sacred habit, which consists only of two woollen wrappers, one wrapped about their middle to cover their privities, and the other thrown over their shoulders, having their heads bare, and a kind of slippers which cover neither the heel nor the instep, and so enter the sacred territory in their way to Mecca. While they have this habit on, they must neither hunt nor fowl, (though they are allowed to fish); which precept is so punctually observed, that they will not kill even a louse or flea if they find them on their bodies: there are some noxious animals, however, which they have permission to kill during the pilgrimage, as kites, ravens, scorpions, mice, and dogs given to bite. During the pilgrimage, it behoves a man to have a constant guard over his words and actions; to avoid all quarrelling or ill language, all converse with women, and all obscene discourse; and to apply his whole attention to the good work he is engaged in.

The pilgrims, being arrived at Mecca, immediately visit the temple; and then enter on the performance of the prescribed ceremonies, which consist chiefly in going in procession round the Caaba, in running between the mounts Safa and Merwa, in making the station on Mount Arafat, and slaying the victims, and shaving their heads in the valley of Mina.

In compassing the Caaba, which they do seven times, beginning at the corner where the black stone is fixed, they use a short quick pace the three first times they go round it, and a grave ordinary pace the four last; which, it is said, was ordered by Mahomet, that his followers might show themselves strong and active to cut off the hopes of the infidels, who gave out that the immoderate heats of Medina had rendered them weak. But the aforesaid quick pace they are not obliged to use every time they perform this piece of devotion, but only at some particular times. So often as they pass by the black stone, they either kiss it, or touch it with their hand, and kiss that.

The running between Safa and Merwa is also performed seven times, partly with a slow pace and partly running: for they walk gravely till they come to a place between two pillars; and there they run, and afterwards walk again; sometimes looking back, and sometimes stooping, like one who had lost something, to represent Hagar seeking water for her son: for the ceremony is said to be as ancient as her time.

On the ninth of Dhu'lhajja, after morning prayer, the pilgrims leave the valley of Mina, whither they come the day before; and proceed in a tumultuous and rushing manner to Mount Arafat, where they stay to perform their devo-

tions till sunset: then they go to Mozdalifa, an oratory between Arafat and Mina; and there spend the night in prayer and reading the Koran. The next morning by day-break they visit al Masher al Karam, or the sacred monument; and, departing thence before sunrise, haste by Batn Mohasser to the valley of Mina, where they throw seven stones at three marks or pillars, in imitation of Abraham, who, meeting the devil in that place, and being by him disturbed in his devotions, or tempted to disobedience when he was going to sacrifice his son, was commanded by God to drive him away by throwing stones at him; though others pretend this rite to be as old as Adam, who also put the devil to flight in the same place, and by the same means.

This ceremony being over, on the same day, the tenth of Dhu'lhajja, the pilgrims slay their victims in the said valley of Mina; of which they and their friends eat part, and the rest is given to the poor. These victims must be either sheep, goats, kine, or camels: males, if of either of the two former kinds; and females, if of either of the latter; and of a fit age. The sacrifices being over, they shave their heads and cut their nails, burying them in the same place; after which the pilgrimage is looked on as completed; though they again visit the Caaba, to take their leave of that sacred building.

The rapid success which attended the propagation of this new religion was owing to causes that are plain and evident, and must remove or rather prevent our surprise, when they are attentively considered. The terror of Mahomet's arms, and the repeated victories which were gained by him and his successors, were, no doubt, the irresistible arguments that persuaded such multitudes to embrace his religion and submit to his dominion. Besides, his law was artfully and marvellously adapted to the corrupt nature of man; and, in a more particular manner, to the manners and opinions of the eastern nations, and the vices to which they were naturally addicted: for the articles of faith which it proposed were few in number, and extremely simple; and the duties it required were neither many nor difficult, nor such as were incompatible with the empire of appetites and passions. It is to be observed farther, that the gross ignorance, under which the Arabians, Syrians, Persians, and the greatest part of the eastern nations, laboured at this time, rendered many an easy prey to the artifice and eloquence of this bold adventurer. To these causes of the progress of Mahometanism, we may add the bitter dissensions and cruel animosities that reigned among the Christian sects, particularly the Greeks, Nestorians, Eutychians, and Monophysites; dissensions that filled a great part of the east with carnage, assassinations, and such detestable enormities as rendered the very name of Christianity odious to many. We might add here, that the Monophysites and Nestorians, full of resentment against the Greeks, from whom they had suffered the bitterest and most injurious treatment, assisted the Arabians in the conquest of several provinces, into which, of consequence, the religion of Mahomet was afterwards introduced. Other causes of the sudden progress of that religion will naturally occur to such as consider attentively its spirit and genius, and the state of the world at that time.

MAHOMETANS, those who believe in the religion and divine mission of Mahomet. See MAHOMET, MAHOMETANISM, and ALCORAN.

MAHRATTA. See MARHATTA.

MAHWAH, or MAWEE. In botany, an East Indian tree, so called by the natives of Bahar and the neighbouring countries, but of which the Shanscrit name is madhuca or madhudruma. According to lieut. C. Hamilton, by whom a very particular account of this tree is given in the Asiatic Researches, it is of the class of the polyandria monogynia of Linnéus, but of a genus not described by him.

The tree, when full grown, is about the size of a common mango, with a bushy head and oval leaves a little pointed; its roots spreading horizontally, are sunk but little in the earth; the trunk, which is often of a considerable thickness, rises seldom to any great height, without giving off branches; it is, however, not uncommon to see it shoot up clear to the length of eight or ten feet: the wood itself is moderately hard, fine grained, and of a reddish colour. By incision the tree affords a resinous gum from the bark.

The flowers are of a nature very extraordinary, "differing essentially (says Mr. Hamilton) from those of any other plant with which I am acquainted, as they have not, in any respect, the usual appearance of such, but rather resemble berries; and I, like many others, had long conceived them to be the fruit of the Mahwah." The tree drops its leaves in the month of February, and early in March these flowers begin to come out in clusters of thirty, forty, or fifty, from the extremity of every small branch; and, from this period till the latter end of April, as the flowers come to maturity (for they never open or expand), they continue falling off, with their antheræ, in the mornings, a little after sunrise; when they are gathered; and afterwards dried by an exposure of a few days in the sun: when thus prepared, they very much resemble a dried grape, both in taste and flavour. Immediately after the flowers drop off, fresh shoots are made for the new leaves, which soon make their appearance, coming presently to their full growth.

The fruit (properly so called) is of two sorts in shape; the one resembling a small walnut, the other somewhat larger and pointed: it is ripe towards the middle of May; and continues dropping from the tree till the whole has fallen which is generally about the beginning or towards the middle of June. The outer covering, or pericarp, which is of a soft texture, commonly bursts in the fall, so that the seeds are very easily squeezed out of it: the seeds are somewhat of the shape, but longer than an olive. These seeds are replete with a thick oil, of the consistence of butter or ghee, which is obtained by expression.

From this description it may easily be conceived, that the Mahwah tree and its productions are of singular and general use, especially in those dry and barren countries, which, from the nature of their situation, are not so well calculated for producing in plenty or perfection the other necessaries of life.

The corolla or flower, after being dried as before described, is eaten by the natives raw or dressed with their curries; and, when even simply boiled with rice, they afford a strengthening and wholesome nourishment. They are indeed, our author tells us, often applied to a less laudable purpose; for being fermented, they yield by distillation a strong spirit, which the people here sell so very cheap, that for one pice (about a halfpenny) may be purchased no less than a cutcha-seer (above a pint English), with which any man may get completely drunk. These flowers make an article of trade; being exported from this country to Patna, and elsewhere in no inconsiderable quantities.

The oil yielded by the fruit, as before mentioned, resembles ghee so much, that, being cheaper, the natives often mix it with that commodity. They use it the same as ghee in their victuals, and in the composition of some sorts of sweetmeats; and burn it in their lamps. It is also regarded as a salutary remedy, applied exteriorly to wounds and all cutaneous eruptions. It is at first of the consistence of common oil, but soon coagulates: after being kept for some time, it acquire a bitterish taste and rancid smell, which renders it somewhat less agreeable as an article of food: but this is an inconvenience which, by the oil being properly clarified and prepared at first, might be perhaps avoided. This oil is also exported both in its adulterated and original state to Patna and other parts of the low country. The gum has not been applied to any use; but might be collected in large quantities in the months of March and April, about the time the flowers come out.

MAIA, in fabulous history, the daughter of Atlas and Pleione. She was the mother of Mercury by Jupiter. She was one of the Pleiades, the most luminous of the seven sisters. (See PLEIADES.) Also, a surname of Cybele.

MAID. MA'IDEN. *s.* (mæðen, mægðen, Saxon; *maegd*, Dutch.) 1. An unmarried woman; a virgin (*Dryden*). 2. A woman servant (*Prior*). 3. Female (*Leviticus*).

MAID. *s.* A species of skate fish.

MA'IDEN. *a.* 1. Consisting of virgins (*Addison*). 2. Fresh; new; unused; unpolluted (*Shakspeare*).

MAIDEN, an instrument for beheading criminals.

Of the use and form of this instrument Mr. Pennant gives the following account: "It seems to have been confined to the limits of the forest of Hardwick, or the 18 towns and hamlets within its precincts. The time when this custom took place is unknown; whether earl Warren, lord of this forest, might have established it among the sanguinary laws then in use against the invaders of the hunting rights, or whether it might not take place after the woollen manufactures at Halifax began to gain strength, is uncertain. The last is very probable; for the wild country around the town was inhabited by a lawless set, whose depredations on the cloth-tenters might soon stifle the efforts of infant industry. For the protection of trade, and for the greater terror of offenders by speedy execution, this custom seems to have been established, so as at last to receive the force of law, which was, 'That if a felon be taken within the liberty of the forest of Hardwick, with goods stolen out, or within the said precincts, either hand-habend, back-berand, or confession'd, to the value of thirteen pence halfpenny, he shall, after three market days or meeting days within the town of Halifax, next after such his apprehension, and being condemned, be taken to the gibbet, and there have his head cut from his body.'

"The offender had always a fair trial; for as soon as he was taken, he was brought to the lord's bailiff at Halifax; he was then exposed on the three markets (which here were held thrice in a week), placed in a stocks, with the goods stolen on his back, or, if the theft was of the cattle kind, they were placed by him; and this was done both to strike terror into others, and to produce new informations against him. The bailiff then summoned four freeholders of each town within the forest to form a jury. The felon and prosecutors were brought face to face; and the goods, the cow or horse, or whatsoever was stolen, produced. If he was found guilty, he was remanded to prison, had a week's time allowed for preparation, and then was conveyed to this spot, where his head was struck off by this machine. I should have premised, that if the criminal, either after apprehension, or in the way to execution, could escape out of the limits of the forest (part being close to the town), the bailiff had no farther power over him; but if he should be caught within the precincts at any time after, he was immediately executed on his former sentence.

"This privilege was very freely used during the reign of Elizabeth: the records before that time were lost. Twenty-five suffered in her reign, and at least twelve from 1623 to 1650; after which I believe the privilege was no more exerted.

"This machine of death is now destroyed; but I saw one of the same kind in a room under the parliament house at Edinburgh, where it was introduced by the regent Morton, who took a model of it as he passed through Halifax, and at length suffered by it himself. It is in form of a painter's easel, and about ten feet high: at four feet from the bottom is a cross bar on which the felon lays his head, which is kept down by another placed above. In the inner edges of the frames are grooves; in these is placed a sharp axe, with a vast weight of lead, supported at the very summit with a peg: to that peg is fastened a cord, which the executioner cutting, the axe falls, and does the affair effectually, without suffering the unhappy criminal to undergo a repetition of strokes, as has been the case in the common method. I must add, that if the sufferer is condemned for stealing a horse or a cow, the string is tied to the beast, which, on being whipped, pulls out the peg, and becomes the executioner." This apparatus is now in possession of the Scottish Antiquarian Society.

Maiden is also the name of a machine first used in Yorkshire, and since introduced into other places, for washing linen; consisting of a tub 19 inches high, and 27 in diameter at the top, in which the linen is put, with hot water and soap, to which is adapted a cover, fitting it very closely, and fastened to the tub by two wedges; through a hole in the middle of the cover passes an upright piece of wood, kept at a proper height by a peg above, and furnished with two handles, by which it is turned backward and forward: to the lower end of this upright piece is fastened a round piece of wood, in which are fixed several pieces, like cogs of a wheel. The operation of this machine is to make the linen pass and repass quick through the water.

Maiden hair, in botany. See Adiantum.

Maiden hair (Canada). Adiantum Canadense, in medicine, the adiantum pedatum of Linnéus. In common use in France, like the officinal adiantum in our own country, is a pectoral, and demulcent, and perhaps possessing superior virtues.

Maiden hair (English). See Adiantum.

Maiden hair tree. Ginkgo. Ginan itsio. The salisburia of the Linnéan system. It is common to China and Japan, and bears a fruit about the size of a damask plum, containing a kernel resembling that of our apricot. It is these that make a part of our deserts at all public feasts and entertainments. They are said to promote digestion, and to cleanse the stomach and bowels. See Salisburia.

MA'IDENHEAD. Ma'idenhode. Ma'idenhood. *s.* (from *maiden.*) 1. Virginity; virginal purity; freedom from contamination (*Milton*). 2. Newness; freshness; uncontaminated state (*Wotton*).

Maidenhead, a town in Berkshire, governed by a mayor, with a market on Wednesday, and a good trade in malt, meal, and timber. It is seated on the Thames, over which is a bridge, 12 miles E by N. of Reading, and 26 W. by N. of London.

MAIDENOI, an island in the Pacific ocean, 36 miles long and nine broad. In the N.W. part of it native copper is found. Lon. 167. 10 E. Lat. 54. 40 N.

MAIDEN-RENTS, in our old writers, a noble paid by the tenants of some manors on their marriage. This was said to be given to the lord for his omitting the custom of marcheta, whereby he was to have the first night's lodging with his tenant's wife; but it seems more probably to have been a fine for a license to marry a daughter.

MA'IDHOOD. *s.* (from *maid.*) Virginity (*Shakspeare*).

MA'IDMARIAN. *s.* (*puer ludius,* Latin.) A kind of dance (*Temple*).

MA'IDPALE. *a.* (*maid* and *pale.*) Pale like a sick virgin (*Shakspeare*).

MAIDSE'RVANT. *s.* A female servant (*Swift*).

MAIDSTONE, a borough and the county-town of Kent, governed by a mayor, with a market on Thursday. It has a brisk trade in exporting the commodities of the county, particularly hops, of which there are numerous plantations around; here are likewise paper-mills, and a manufacture of linen. In 1801 the number of inhabitants was 8027. It is seated on the Medway, over which is a bridge, 20 miles W. of Canterbury, and 34 E.S.E. of London. Lon. 0. 38 E. Lat. 51. 16 N.

MAJE'STICAL. Maje'stic. *a.* (from *majesty.*) 1. August; having dignity; grand; imperial; regal; great of appearance (*Denham*). 2. Stately; pompous; splendid (*Hook.*). 3. Sublime; elevated; lofty (*Dryden*).

MAJE'STICALLY. *ad.* (from *majestical.*) With dignity; with grandeur (*Glanville*).

MAJESTY, a title given to kings, which frequently serves as a term of distinction. The word seems composed of the two Latin words, *major,* greater, and *status,* state. The emperor is called sacred majesty, imperial majesty, and Cæsarean majesty: the king of Hungary is styled his apostolic majesty. The king of Spain is termed his most catholic majesty: and the king of Portugal, his most faithful majesty. The king of France used to be called his most Christian majesty; and when he treated with the emperor, the word sacred was added: he was afterwards called simply, king of the French. Bonaparte assumed the title of emperor and king of France.—With respect to other kings, the name of the kingdom is added; as, his Britannic majesty, his Prussian majesty, &c. Formerly princes were more sparing in giving titles, and more modest in claiming them: before the reign of Charles V. the king of Spain had only the title of highness; and before that of Henry VIII. the kings of England were only addressed under the titles of grace and highness.

Under the Roman republic, the title majesty (*majestas*) belonged to the whole body of the people, and to the principal magistrates; so that to diminish or wound the majesty of the commonwealth, was to be wanting in respect to the state or to its ministers. But the power afterwards passing into the hands of a single person, the appellation of majesty was transferred to the emperor and the imperial family. Pliny compliments Trajan on his being contented with the title of greatness; and speaks very invidiously of those who affected that of majesty. And yet this last seems to be the most modest and just title that can be attributed to sovereigns, since it signifies no more than the royalty or sovereign power.

MAII INDUCTIO, an ancient custom for the priest and people of country-villages to go in procession to some adjoining wood on a May-day morning; and return in a kind of triumph, with a May-pole, boughs, flowers, garlands, and other tokens of the spring. This May-game, or rejoicing at the coming of the spring, was for a long time observed, and still is in some parts of England; but there was thought to be so much heathen vanity in it, that it was condemned and prohibited within the

diocese of Lincoln by the good old bishop Grosthead.

MAIL (*maille*), a term primarily applied to the meshes or holes in net-work.

MAIL (Coat of). See COAT. It is called also a habergeon. Anciently they also wore shirts of mail under the waistcoats, to serve as a defence against swords and poniards. We also read of gloves of mail.

MAIL, or MALL, also signifies a round ring of iron; whence the play of pall-mall, from *palla*, a ball, and *maille*, the round ring through which it is to pass.

MAIL, or MAILLE, in our old writers, a small kind of money. Silver halfpence were likewise termed mailles, 9 Henry V. By indenture in the mint, a pound weight of old sterling silver was to be coined into 360 sterlings or pennies, or 720 mails or half-pennies, or 1440 farthings. Hence the word mail was derived, which is now vulgarly used in Scotland to signify an annual rent.

MAIL, or MAILL, on ship-board, a square machine composed of a number of rings interwoven net-wise, and used for rubbing off the loose hemp which remains on lines or white cordage after it is made.

MAIL is likewise used for the leather bag wherein letters are carried by the post.

MAIL-COACHES. See COACH.

*To* MAIL. *v. a.* (from the noun.) 1. To arm defensively; to cover as with armour (*Shakspeare*). 2. To bundle in a wrapper (*Shakspeare*).

MAILCOTAY, a lofty fortress of Hindustan, in Mysore, and one of the most celebrated places of Hindu worship. The large temple is a square building of great dimensions, and the jewels belonging it are very valuable. Here, in 1772, Hyder was completely routed by the Mahrattas. It is 17 miles north of Seringapatam.

*To* MAIM. *v. a.* (*mehaigner*, to maim, old French.) To deprive of any necessary part; to cripple by loss of a limb (*Shakspeare*).

MAIM. *s.* (from the verb.) 1. Privation of some essential part; lameness by a wound or amputation (*Hooker*). 2. Inquiry; mischief (*Shaks.*). 3. Essential defect (*Hayw.*).

MAIM, MAIHEM, or MAYHEM, in law, a wound by which a person loses the use of a member that might have been a defence to him; as when a bone is broken, a foot, hand, or other member cut off, or an eye put out; though the cutting off an ear or nose, or breaking the hinder-teeth, was formerly held to be no maim. A maim by castration was anciently punished with death, and other maims with loss of member for member; but afterwards they were only punished by fine and imprisonment. It is now enacted by the statute 22 and 23 Car. II. that if any person, from malice aforethought, shall disable any limb or member of any of the king's subjects with an intent to disfigure him, the offender, with his aiders and abettors, shall be guilty of felony without benefit of clergy; though no such attainder shall corrupt the blood, or occasion forfeiture of lands, &c.

MAIMONIDES, MOSES, or MOSES THE SON OF MAIMON, a celebrated rabbi, called by the Jews the eagle of the doctors, was born of an illustrious family at Cordova in Spain, in 1131. The early part of his education was undertaken by his father, who afterwards placed him under the tuition of rabbi Joseph, the son of Megas, a person on whose profound learning he has bestowed the highest praise; and, according to Leo Africanus, he had also among his tutors the learned Arabians Ibn Thophail and Averroes. He is commonly named Moses Ægyptius, because he settled in Egypt, where he spent his whole life in quality of physician to the sultan. Here he opened a school, which was soon filled with pupils from all parts, from Alexandria and Damascus especially, whose proficiency under him spread his fame all over the world. He was no less eminent in philosophy, mathematics, and divinity, than in medicine. Casaubon affirms it may be truly said of him, as Pliny of old said of Diodorus Siculus, that "he was the first of his tribe who ceased to be a trifler." It would be tedious to enumerate all the works of Maimonides; some were written originally in Arabic, but are now extant only in Hebrew translations. "Those (says Collier) who desire to learn the doctrine and the canon law contained in the Talmud may read Maimonides's compendium of it in good Hebrew, in his book entitled Iad; wherein they will find great part of the fables and impertinences in the Talmud entirely discarded. But the More Nevochim is the most valued of all his works; designed to explain the obscure words, phrases, metaphors, &c. in scripture, which, when literally interpreted, have either no meaning or appear absurd.

MAINA, a seaport of European Turkey, in the Morea, which gives name to a district that lies between two bays of the Mediterranean sea. The inhabitants could never be subdued by the Turks, on account of their valour and their mountains. The town is seated on the bay of Coron, 46 miles S. by W. of Misitra. Lon. 22. 10 E. Lat. 36. 34 N.

MAINE, a district belonging to the state of Massachusets, 300 miles long and 100 broad; bounded on the N.W. by the high lands, which separate the rivers that flow into the St. Lawrence and those that flow into the Atlantic; on the E. by the river St. Croix, and a line drawn due N. from its source to the said high lands, which divides this territory from New Brunswick; on the S.E. by the Atlantic; and on the W. by New Hampshire. It is divided into five counties, York, Cumberland, Lincoln, Hancock, and Washington. The chief rivers are the Penobscot, Kennebec, Saco, Androscoggin, St. John, and St. Croix; and it has several small lakes. Though an elevated tract, it cannot be called mountainous, and a great proportion of the lands are arable and exceedingly fertile. Hops are the spontaneous

growth of this country. The trees are white pine, spruce, maple, beech, white and gray oak, and yellow birch; these, as ship timber, boards, and every species of split lumber, are the principal exports of the country. The heat in summer is intense, and the cold in winter extreme; all the lakes and rivers are usually passable on ice, from Christmas till the middle of March. Portland is the capital.

MAINE, a late province of France, bounded on the N. by Normandy, E. by Orleanois, S. by Touraine and Anjou, and W. by Bretagn. It now forms the departments of Mayenne and Sarte.

MAINE, a river of Germany, which rises in Franconia, flows by Bamberg, Wurtzburg, Aschaffenburg, Hanau, and Frankfort, and joins the Rhine a little above Mentz.

MAINLAND, the largest of the Shetland isles, 60 miles long and in some places 16 broad; but it projects into the sea with many irregular promontories, and is indented by numerous bays and harbours. The face of the country exhibits a prospect of black craggy mountains and marshy plains, interspersed with some verdant spots, which appear smooth and fertile. Neither tree nor shrub is to be seen, except the juniper and the heath. The mountains abound with various kinds of game. Lofty cliffs, impending over the ocean, are the haunts of eagles, falcons, and ravens. The deep caverns underneath shelter seals and otters; and to the winding bays resort swans, geese, scarfs, and other aquatic birds. The seas abound with cod, turbot, and haddock; and, at certain seasons, with shoals of herrings. Lobsters, oysters, muscles, &c. are also plentiful. The hills are covered with black-cattle and sheep of a small breed; the horses are also of a diminutive size, but remarkably strong, and called Shetland ponies. The rivulets and lakes abound with salmon, trout, &c. No mines have been wrought, but there are visible appearances of various metallic ores. The inhabitants are hardy, docile, and ingenious. They manufacture linen and woollen cloth for their own use; and worsted stockings, some of fine texture and great value for exportation; but their principal occupation is fishing. Lerwick is the capital.

MAINLAND, the principal of the Orkney isles. See POMONA.

MA'INLAND. *s.* (*main* and *land.*) Continent (*Spenser*).

MA'INLY. *ad.* (from *main.*) 1. Chiefly; principally (*Woodward*). 2. Greatly; hugely (*Bacon*).

MA'INMAST. *s.* (*main* and *mast.*) The chief or middle mast (*Dryden*).

MAINOUR, MANOUR, or MEINOUR. (from the French, *manier*, i.e. *manu tractare.*) In a legal sense denotes the thing that a thief taketh away or stealeth: as to be taken with the mainour (*Pl. Cor.* fol. 179.), is to be taken with the thing stolen about him: and again (fol. 194.) it was presented, that a thief was delivered to the sheriff or viscount, together with the mainour: and again (fol. 186.), if a man be indicted, that he feloniously stole the goods of another, where, in truth, they are his own goods, and the goods be brought into the court as the mainour; and if it be demanded of him, what he saith to the goods, and he disclaims them; though he be acquitted of the felony, he shall lose the goods: and again (fol. 149.), if the defendant were taken with the mainour, and the mainour be carried to the court, they, in ancient times, would arraign him upon the mainour, without any appeal or indictment. (*Cowel*).

MA'INPERNABLE. *a.* Bailable; that may be admitted to give surety.

MA'INPERNOR. *s.* Surety; bail (*Davies*).

MA'INPRISE. *s.* (*main* and *pris*, French.) Delivery into the custody of a friend, upon security given for appearance; bail (*Davies*).

*To* MA'INPRISE. *v. a.* To bail.

MA'INSAIL. *s.* (*main* and *sail.*) The sail of the mainmast (*Acts*).

MA'INSHEET. *s.* (*main* and *sheet.*) The sheet or sail of the mainmast (*Dryden*).

*To* MAINTA'IN. *v. a.* (*maintenir*, Fr.) 1. To preserve; to keep (*Harvey*). 2. To defend; to hold out (*Grew*). 3. To vindicate; to justify (*Shakspeare*). 4. To continue; to keep up (*Dryden*). 5. To keep up; to support the expence of (*Shakspeare*). 6. To support with the conveniences of life (*South*). 7. To preserve from failure (*Blackmore*).

*To* MAINTA'IN. *v. a.* To support by argument; to assert as a tenet (*Dryden*).

MAINTA'INABLE. *a.* (from *maintain.*) Defensible; justifiable (*Hayward.*)

MAINTA'INER. *s.* (from *maintain.*) Supporter; cherisher (*Spenser*).

MA'INTENANCE. *s.* (*maintenant*, Fr.) 1. Supply of the necessaries of life; sustenance; sustentation (*Hooker*). 2. Support; protection; defence (*Spenser*). 3. Continuance; security from failure (*South*).

MAINTENANCE, in law, bears a near relation to barretry; being an officious intermeddling in a suit that no way belongs to one, by maintaining or assisting either party with money or otherwise, to prosecute or defend it: a practice that was greatly encouraged by the first introduction of uses. This is an offence against public justice, as it keeps alive strife and contention, and perverts the remedial process of the law into an engine of oppression. And therefore, by the Roman law, it was a species of the *crimen falsi*, to enter into any confederacy, or do any act to support another's law-suit, by money, witnesses, or patronage. A man may, however, maintain the suit of his near kinsman, servant, or poor neighbour, out of charity and compassion, with impunity. Otherwise the punishment by common law is fine and imprisonment; and by the statute 32 Henry VIII. c. 9. a forfeiture of 10l.

MAINTENON (Frances d'Aubigné, madame de), a famous French lady, born 1635, in the prison of Niort, where her father was confined for some ill conduct against Richelieu. The father, after his enlargement, took all his family, 1639, to America, and settled at Mar-

tiniquo, where he ruined himself by gaming. On his death, in 1646, the widow returned to France, leaving her daughter as a pledge in the hands of her creditors; but the child was soon after sent after the mother, and taken under the protection of her aunt, madame Villette, at Poictou. As, however, she had been brought up a protestant, she was by artifice converted to the Roman catholic religion. In 1651 she formed an union with the abbé Scarron, who was old and deformed, but witty, and the favourite of the court. On the death of her husband, in 1660, her distresses returned, and she solicited in vain for a small pension from the court. In 1671, however, she was appointed over the education of the young duke de Maine, the king's son, by his mistress, madame de Montespan, and from this situation arose her greatness. The king saw her, and was captivated with her manners and person, and in 1679 he purchased for her the estate of Maintenon, from which she derived her new title. In this dangerous elevation, madame Maintenon conducted herself with great propriety; she never interfered with the politics of the court, her sole wish was to please the king, and in this she so happily succeeded, that though she was two years older than himself, he married her privately, 1685. Now raised from a mistress to a wife, a secret, however, which was never revealed, she applied herself more frequently to acts of religion and piety, and founded an abbey for women of quality, afterwards called St. Cyr, of which she called herself the superior. She also prevailed upon Racine, now become a courtier, to write a tragedy upon some striking subject from the bible, and in consequence of this he produced his Esther, and also his Athaliah, which were originally acted by the religious devotees of St. Cyr. Upon the king's death, in 1715, she retired to privacy at St. Cyr, and long fatigued with the splendour of greatness, she acknowledged the emptiness of human distinction, and ended her days in penitence and devotion. She died 1719. Some have accused her of causing the revocation of the edict of Nantes, but it is certain that she extended her protection to those who where persecuted for their religion. The happiest part of her life was spent, says Voltaire, in the company of the buffoon Scarron; and in a letter to a friend, she declares that her grandeur was productive only of melancholy, and that though courted, flattered, and admired, she felt in her mind a dismal vacuity. Some of her letters have been published.

MA'INTOP. *s.* (*main* and *top.*) The top of the mainmast (*Addison*).

MA'INYARD. *s.* (*main* and *yard.*) The yard of the mainmast (*Arbuthnot*).

MA'JOR. *a.* (*major*, Lat.) 1. Greater in number, quantity, or extent. 2. Greater in dignity (*Shakspeare*).

MA'JOR. *s.* 1. The officer above the captain; the lowest field officer. 2. A mayor or head officer of a town. 3. The first proposition of a syllogism, containing some generality (*Boyle*). 4. MAJOR-*general.* The general officer of the second rank (*Tatler*) 5. MAJOR-*domo.* One who holds occasionally the place of master of the house.

MAJOR, in the art of war, the name of several officers of very different ranks and functions.

*Major-general.* See GENERAL.

*Major of a regiment of foot*, the next officer to the lieutenant-colonel, generally promoted from the eldest captain: he is to take care that the regiment be well exercised, to see it march in good order, and to rally it in case of being broke in action: he is the only officer among the infantry that is allowed to be on horseback in time of action, that he may the more readily execute the colonel's orders.

*Major of a regiment of horse*, as well as foot, ought to be a man of honour, integrity, understanding, courage, activity, experience, and address: he should be master of arithmetic, and keep a detail of the regiment in every particular: he should be skilled in horsemanship, and ever attentive to his business: one of his principal functions is, to keep an exact roster of the officers for duty: he should have a perfect knowledge in all the military evolutions, as he is obliged by his post to instruct others, &c.

*Town-major*, the third officer in order in a garrison, and next to the deputy-governor. He should understand fortification, and has a particular charge of the guards, rounds, patroles, and centinels.

*Brigade-major*, is a particular officer appointed for that purpose only in camp: he goes every day to head-quarters to receive orders from the adjutant-general: there he writes exactly whatever is dictated to him: from thence he goes and gives the orders, at the place appointed for that purpose, to the different majors or adjutants of the regiments which compose that brigade, and regulates with them the number of officers and men which each are to furnish for the duty of the army; taking care to keep an exact roster, that one may not give more than another; and that each march in their tour: in short, the major of brigade is charged with the particular detail in his own brigade, in much the same way as the adjutant-general is charged with the general detail of the duty of the army. He sends every morning to the adjutant-general an exact return, by battalion and company, of the men of his brigade missing at the retreat, or a report expressing that none are absent: he also mentions the officers absent with or without leave.

*Major of artillery*, is also the next officer to the lieutenant-colonel. His post is very laborious, as the whole detail of the corps particularly rests with him; and for this reason all the non-commissioned officers are subordinate to him, as his title of serjeant-major imports: in this quality they mvst render him an exact account of every thing which comes to their knowledge, either regarding the duty or wants of the artillery and soldiers. He should possess a perfect knowledge of the power of artillery,

together with all its evolutions. In the field he goes daily to receive orders from the brigade-major, and communicates them with the parole to his superiors, and then dictates them to the adjutant. He should be a very good mathematician, and be well acquainted with every thing belonging to the train of artillery, &c.

*Major of engineers*, commonly with us called sub-director, should be very well skilled in military architecture, fortification, gunnery, and mining. He should know how to fortify in the field, to attack and defend all sorts of posts, and to conduct the works in a siege, &c. See ENGINEER.

*Serjeant-major*, is a non-commissioned officer, of great merit and capacity, subordinate to the adjutant as he is to the major. See SERJEANT.

*Drum-major*, is not only the first drummer in the regiment, but has the same authority over his drummers as the corporal has over his squad. He instructs them in their different beats; is daily at orders with the serjeants, to know the number of drummers for duty. He marches at their head when they beat in a body. In the day of battle, or at exercise, he must be very attentive to the orders given him, that he may regulate his beats according to the movements ordered.

*Fife-major*, is he that plays the best on that instrument, and has the same authority over the fifers as the drum-major has over the drummers. He teaches them their duty, and appoints them for guards, &c.

MAJOR, in law, a person who is of age to manage his own affairs. By the civil law a man is not a major till the age of 25 years; in England, he is a major at 21, as in Normandy at 20.

MAJOR, in logic, is understood of the first proposition of a regular syllogism. It is called major, because it has a more extensive sense than the minor proposition, as containing the principal term. See LOGIC.

MAJOR and MINOR, in music, are applied to concords which differ from each other by a semi-tone. See CONCORD.

MAJOR TONE is the difference between the fifth and fourth; and major semi-tone the difference between the major fourth and the third. The major tone surpasses the minor by a comma.

MAJOR-DOMO, an Italian term, frequently used to signify a steward or master of the household.

MAJORANA. (*majorana*, corrupted from *majorano quod mense Maiæ floreit*, because it flowers in May.) Sweet marjoram. Origanum majorana of Linnéus. Orig. foliis ovatis obtusis, spicis subrotundis compactis pubescentibus. Class and order didynamia gymnospermia. This has been long cultivated in ou gardens, and is in frequent use for culinary purposes. The leaves and tops have a pleasant smell, and a moderately warm, aromatic, bitterish taste. The medicinal qualities of the plant are similar to those of the wild plant (see ORIGANUM) · but being much more fragrant, it is thought to be more cephalic. It was formerly directed in the pulvis sternutatorius by the London and Edinburgh pharmacopœias with a view to the agreeable odour which it diffuses to the asarabacca, rather than to its errhine power, which is very inconsiderable. In its recent state it is said to have been successfully applied to schirrous tumours of the breast.

MAJORANA SYRIACA. In medicine. See MARUM SYRIACUM.

MAJORA'TION. *s.* (from *major.*) Increase; enlargement (*Bacon.*)

MAJO'RITY. *s.* (from *major.*) 1. The state of being greater (*Grew*). The greater number (*Addison*). 3. Ancestry (*Brown*). 4. Full age; end of minority (*Davies*). 5. First rank: obsolete (*Shaks.*). 6. The office of a major.

MAIRAN (Jean-Jacques d'Ortous de), descended from a noble family at Besiers, was born in that city in 1678, and died at Paris of a defluxion on the lungs on the 20th of February 1771, at the age of 93. He was one of the most illustrious members of the Academy of Sciences and of the French Academy. Being early connected with the former society, he, in the year 1741, succeeded Fontenelle in the office of secretary. This station he filled with the most distinguished success till the year 1744: and, like his predecessor, possessed the faculty of placing the most abstract subjects in the clearest light; a talent which is very rare, but which appears conspicuous in all his works. The chief of them are, 1. Dissertation sur la Glace, the last edition of which was printed in 1749, 12mo. This excellent little tract has been translated into German and Italian. 2. Dissertation sur la cause de la lumiere des Phosphores, 1717, 12mo. 3. Traité historique et physique de l'Aurore Boreale, first published in 12mo, 1733, and afterwards much enlarged and printed in 4to, in 1754. The system embraced by the author is liable to be controverted; but the book displays great taste and erudition. 4. Lettre au Pere Parennin, contenant diverses questions sur la Chine, 12mo. This is a very curious work, and is full of that philosophical spirit which characterizes the author's other publications. 5. A great number of papers in the memoirs of the Academy of Sciences (since 1719), of which he published some volumes. 6. Several Dissertations on particular subjects, which form only small pamphlets. 7. The Eloges of the Academicians of the Academy of Sciences, who died in 1741, 1742, 1743, in 12mo, 1747. Without imitating Fontenelle, the author attained almost equal excellence by his talent of discriminating characters, appreciating their worth, and giving them their due share of praise, without at the same time concealing their defects.

Mairan's reputation extended itself into foreign countries. He was a member of the Imperial Academy at Petersburgh, of the Royal Academy of London, of the Institution at Bologna, of the Royal Societies of Edinburgh and Upsal, &c. The gentleness and sweetness of his manners made him be considered as a per-

fect model of the social virtues. He possessed that amiable politeness, that agreeable gaiety, and that steady firmness, which never fail to procure love and esteem. But we must add, says M. Saverien, that every thing had a reference to himself; self-love and a regard to his own reputation were the motives of all his actions. He was deeply affected with censure or applause, and yet he had many friends. Uniting much gentleness of disposition to an ingenious and agreeable expression of contenance, he possessed the art of insinuating himself into the good graces of others, so as to pave the way to elevation and success. He was honoured with protection and particular marks of regard by the duke of Orleans the regent, who bequeathed to him his watch in his will. The prince of Conti loaded him with favours; and the chancellor Daguesseau, observing in him great originality and ingenuity of thought, appointed him president of the Journal des Sçavans: a station which he filled very much to the satisfaction of the public and of the learned. The private and selfish views imputed to him by M. Saverien never made him deficient in what was due to the strictest probity. An expression of his is remembered, which could have proceeded only from sentiment; "An honest man (said he) is one whose blood is refreshed with the recital of a good action." He was ready at repartee. One day he happened to be in company with a gentleman of the gown, and to differ with him in opinion upon some point which had no more connexion with jurisprudence than with geometry. "Sir (said the magistrate, who supposed that a learned man was a perfect idiot out of his own sphere), we are not now talking of Euclid or Archimedes." "No, nor of Cujas nor Barthole!" replied the academician.

MAJORCA, an island of Spain, 60 miles long and 45 broad, situate in the Mediterranean sea, between Ivica and Minorca. The whole coast is lined with strong towers. The N.W. part is mountainous; the rest produces good corn, olive-trees, fine honey, and delicate wine. It has no rivers, though there are a great many fine fountains and wells. The inhabitants are robust and lively, and make good sailors.

MAJORCA, a strong city, capital of the island of the same name, and a bishop's see. The public squares, the cathedral, and the royal palace, are magnificent. It contains 4000 houses, built after the antique manner; a university, more ancient than celebrated; and 22 churches, besides the cathedral. The harbour is extremely good. It was taken by the English in 1706, and retaken in 1715. It is seated on the S.W. side of the island. Lon. 2. 30 E. Lat. 39. 35 N.

MAITLAND (John), lord of Thyrlestane, was born 1545. He was educated in Scotland, practised with such success that James VI. made him his secretary of state, 1584, and the next year lord chancellor of the kingdom. He attended his master to Denmark in 1589, and died 1595. He wrote Epigrammata Latina, &c.

MAITLAND (William), a Scotch antiquarian, born in Forfarshire, 1693. From a hair merchant he became a man of letters, and settled in London, where he published his History of London, folio, 1739. In 1753 appeared his History of Edinburgh, folio, and in 1757 his History and Antiquities of Scotland, 3 vols. folio. He died at Montrose, aged 64.

MAITTAIRE (Michael), a learned English writer, was born in 1668. Dr. South, canon of Christ-church, made him a student of that house, where he took the degree of M. A. March 23, 1696. From 1695 till 1699 he was second master of Westminster school; which was afterwards indebted to him for Grææ Linguæ Dialecti, in usum Scholæ Westmonasteriensis, 1706, 8vo; and for the English Grammar, applied to, and exemplified in, the English Tongue, 1712, 8vo. In 1711, he published Remarks on Mr. Whiston's Account of the Convocation's proceedings with relation to himself, in a Letter to the right reverend Father in God George Lord Bishop of Bath and Wells, 8vo; also An Essay against Arianism, and some other Heresies; or a Reply to Mr. William Whiston's Historical Preface and Appendix to his Primitive Christianity revived, 8vo. In 1709 he gave the first specimen of his great skill in typographical antiquities, by publishing Stephanorum Historia, vitas ipsorum ac libros complectens, 8vo; which was followed in 1717 by Historia Typographorum aliquot Parisiensium, vitas et libros complectens, 8vo. In 1719, Annales Typographici ab artis inventæ origine ad annum MD, 4to. The second volume, divided into two parts, and continued to the year 1536, was published at the Hague in 1702; introduced by a letter of John Toland, under the title of Conjectura verisimilis de prima Typographiæ Inventione. The third volume, from the same press, in two parts, continued to 1557, and (by an Appendix) to 1664, in 1725. In 1733 was published at Amsterdam what is usually considered as the fourth volume, under the title of Annales Typographici ab artis inventæ origine, ad annum MDCLXIV, opera Mich. Maittaire, A.M. editio nova, auctior et emendatior; tomi primi pars posterior. In 1741 the work was closed at London, by Annalium Typographicorum Tomus quintus et ultimus, indicem in tomos quatuor præeuntes complectens; divided, like the two preceding volumes, into two parts. In the intermediate years, Mr. Maittaire was diligently employed on various works of value. In 1713 he published by subscription Opera et Fragmenta Veterum Poëtarum, 1713, two volumes in folio: the title of some copies is dated 1721. In 1714, he was the editor of a Greek testament, in 2 vols. The Latin writers, which he published separately, most of them with good indexes, came out in the following order: In 1713, Christus Patiens; Justin; Lucretius; Phædrus; Sallust; Terence. In 1715, Catullus; Tibullus; Propertius; Cornelius Nepos; Florus; Horace; Juvenal; Ovid, 3 vols; Virgil. In 1711, Cæsar's Commenta-

ties; Martial; Quintus Curtius. In 1718 and 1725, Velleius Paterculus. In 1719, Lucan. In 1720, Bonefonii Carmina. In 1721 he published, Batrachomyomachia, Græcè, ad veterum exemplarium fidem recusa; glossa Græca, variantibus lectionibus, versionibus Latinis, commentariis et indicibus, illustrata, 8vo. In 1722, Miscellanea Græcorum aliquot Scriptorum Carmina, cum versione Latina et notis, 4to. In 1724 he compiled, at the request of Dr. John Freind (at whose expence it was printed), an index to the works of Aretæus, to accompany the splendid folio edition of that author in 1723. In 1725 he published an excellent edition of Anacreon in 4to, of which no more than 100 copies were printed, and the few errata in each copy corrected by his own hand. A second edition of the like number was printed in 1741, with six copies on fine writing paper. In 1726 he published Petri Petiti Medici Parisiensis in tres priores Aretæi Cappadocis Libros Commentarii, nunc primum editi, 4to. This learned commentary was found among the papers of Grævius. From 1728 to 1733 he was employed in publishing Marmorum Arundelianorum, Seldenianorum, aliorumque Academiæ Oxoniensi donatorum, una cum Commentariis et Indice, editio secunda, folio; to which an Appendix was printed in 1733. Epistola D. Mich. Maittaire ad D. P. Des Maizeaux, in qua Indicis in Annales Typographicos methodus explicatur, &c. is printed in The Present State of the Republic of Letters, August 1733, p. 142. The life of Robert Stephens in Latin, revised and corrected by the author, with a new and complete list of his works, is prefixed to the improved edition of R. Stephens's Thesaurus, 4 vols. in folio, in 1734. In 1736 appeared Antiquæ Inscriptiones duæ, folio; being a commentary on two large copper tables discovered near Heraclea, in the bay of Tarentum. In 1738 were printed at the Hague Græcæ Linguæ Dialecti in Scholæ Regiæ Westmonasteriensis usum recogniti, opera Mich. Maittaire. In 1739 he addressed to the empress of Russia a small Latin poem, under the title of Carmen Epinicium Augustissimæ Russorum Imperatrici sacrum. His name not having been printed in the title-page, it is not so generally known that he was editor of Plutarch's Apophthegmata, 1741, 4to. The last publication of Mr. Maittaire was a volume of poems in 4to, 1742, under the title of Senilia, sive Poetica aliquot in argumentis varii generis tentamnia. Mr. Maittaire died in 1747, aged 79. His valuable library, which had been 50 years collecting, was sold by auction by Messrs. Cock and Langford, at the close of the same year, and the beginning of the following, taking up in all 44 nights. Mr. Maittaire, it may be added, was patronized by the first earl of Oxford, both before and after that gentleman's elevation to the peerage, and continued a favourite with his son the second earl. He was also Latin tutor to Mr. Stanhope, the earl of Chesterfield's favourite son.

MAIZE, in botany. See ZEA.

*To* MAKE. *v. a.* (macan, Saxon; *machen*, German; *maiken*, Dutch.) 1. To create (*Genesis*). 2. To form of materials (*Holder*). 3. To compose (*Waller*). 4. To form by art what is not natural (*Spenser*). 5. To produce or effect as the agent (*Hooker*). 6. To produce as a cause (*Proverbs*). 7. To do; to perform; to practise; to use in action (*Dryden*). 8. To cause to have any quality (*Clarendon*). 9. To bring into any state or condition (*Job*). 10. To form; to settle (*Rowe*). 11. To hold; to keep (*Dryden*). 12. To secure from distress; to establish in riches or happiness (*Shakspeare*). 13. To suffer; to incur (*Bacon*). 14. To commit (*Dryden*). 15. To compel; to force; to constrain (*Locke*). 16. To intend; to purpose to do (*Dryden*). 17. To raise as profit from any thing (*Shak.*). 18. To reach; to tend to; to arrive at (*Dryden*). 19. To gain (*Milton*). 20. To force; to gain by force (*Temple*). 21. To exhibit (*Luke*). 22. To pay; to give (*Leviticus*). 23. To put; to place (*Bacon*). 24. To turn to some use (*Dryden*). 25. To incline to; to dispose to (*Brown*). 26. To effect as an argument (*Hooker*). 27. To represent; to show (*Baker*). 28. To constitute (*Locke*). 29. To amount to (*Galatians*). 30. To mould; to form (*Bacon*). 31. *To* MAKE *away*. To kill; to destroy (*Sidney*). 32. *To* MAKE *away*. To transfer (*Waller*). 33. *To* MAKE *account*. To reckon; to believe (*Bacon*). 34. *To* MAKE *account of*. To esteem; to regard. 35. *To* MAKE *free with*. To treat without ceremony (*Dunciad*). 36. *To* MAKE *good*. To maintain; to defend; to justify (*Knoll.*). 37. *To* MAKE *good*. To fulfil; to accomplish (*Shakspeare*). 38. *To* MAKE *light of*. To consider as of no consequence (*Matthew*). 39. *To* MAKE *love*. To court; to play the gallant (*Addison*). 40. *To* MAKE *merry*. To feast; to partake of an entertainment (*Shakspeare*). 41. *To* MAKE *much of*. To cherish; to foster (*Temple*). 42. *To* MAKE *of*. *What to make of*, is, how to understand (*Addison*). 43. *To* MAKE *of*. To produce from; to effect (*Addison*). 44. *To* MAKE *of*. To consider; to account; to esteem (*Dryden*). 45. *To* MAKE *of*. To cherish; to foster. 46. *To* MAKE *over*. To settle in the hands of trustees (*Hudibras*). 47. *To* MAKE *over*. To transfer (*Hammond*). 48. *To* MAKE *out*. To clear; to explain; to clear one's self (*Arb.*). 49. *To* MAKE *out*. To prove; to evince (*Swift*). 50. *To* MAKE *sure of*. To consider as certain (*Dryden*). 51. *To* MAKE *sure of*. To secure to one's possession (*Dryden*). 52. *To* MAKE *up*. To get together (*Locke*). 53. *To* MAKE *up*. To reconcile (*Shakspeare*). 54. *To* MAKE *up*. To repair (*Ezekiel*). 55. *To* MAKE *up*. To compose, as ingredients (*South*). 56. *To* MAKE *up*. To shape (*Arbuthnot*). 57. *To* MAKE *up*. To supply (*Hooker*). 58. *To* MAKE *up*. To compensate (*Atterbury*). 59. *To* MAKE *up*. To adjust (*Rogers*). 60. *To* MAKE *up*. To accomplish; to conclude; to complete (*Locke*).

*To* MAKE. *v. n.* 1. To tend; to travel; to

go any way (*Shakspeare*). 2. To contribute; to have effect (*Swift*). 3. To operate; to act as a proof of argument, or cause (*Hooker. Dryden*). 4. To show; to appear; to carry appearance (*Arbuthnot*). 5. *To* MAKE *away with*. To destroy; to kill; to make away (*Addison*). 6. *To* MAKE *for*. To advantage; to favour (*Bacon*). 7. *To* MAKE *up for*. To compensate; to be instead (*Swift*). 8. *To* MAKE *with*. To concur with (*Hooker*).

MAKE. *s.* (from the verb.) Form; structure; nature (*Glanville*).

MAKE. *s.* (maca, Saxon.) Companion; favourite friend (*Ben Jonson*).

MA'KEBATE. *s.* (*make* and *debate*.) Breeder of quarrels (*Sidney*).

MA'KER. *s.* (from *make*.) 1. The Creator (*Milton*). 2. One who makes any thing (*Pope*). 3. One who sets any thing in its proper state (*Ascham*).

MA'KEPEACE. *s.* (*make* and *peace*.) Peace-maker; reconciler (*Shakspeare*).

MA'KEWEIGHT. *s.* (*make* and *weight*.) Any small thing thrown in to make up weight (*Philips*).

MAKE, in zoology. See LEMUR.

MALABAR, the name given to a great part of the west coast of the peninsula of Hindustan on this side of the Ganges, extending from the kingdom of Baglala to Cape Comorin, or from the north extremity of the kingdom of Canara as far as Cape Comorin, and lying between 9° and 14° N. lat. It is bounded by the mountains of Balagate on the east; by Deccan on the north; and on the west and south is washed by the Indian sea.

MALABAR PLUM. This fruit, which is the produce of the Eugenia jambos, smells, when ripe, like roses. On the coast of Malabar, where the tree grows plentifully, these plums are in great esteem. They are not only eaten fresh from the trees, but are preserved in sugar, so as to be rendered eatable all the year. Of the flowers a conserve was formerly prepared, which was used in medicine as a mild adstringent.

MALABATHRUM. (μαλαβαθρον: from Malabar in India, whence it was brought, and *betre*, a leaf, Ind.) The leaf of the tree, the bark of which is called cassia. See CASSIA LIGNEA.

MALACA, in ancient geography, surnamed Fæderatorum by Pliny; a maritime town of Bætica: a Carthaginian colony according to Strabo; so called from Malach, signifying salt; a place noted for pickled or salted meat. Now Malaga.

MALACCA, the most southerly part of the great peninsula beyond the Ganges, is about 600 miles in length, and contains a kingdom of the same name. It is bounded by the kingdom of Siam on the north; by the bay of Siam and the Indian ocean on the east; and by the straits of Malacca, which separate it from the island of Sumatra, on the south-west. This country is more to the south than any other in the East Indies; and comprehends the towns and kingdoms of Patan, Pahan, Igohor, Pera, Queda, Borkelon, Ligor; and to the north the town and kingdom of Tanassery, where the Portuguese formerly carried on a great trade. This last either does or did belong to the king of Siam. The people of Malacca are in general subject to the Dutch, who possess all the strong places on the coasts, and compel them to trade on their own terms, excluding all other nations of Europe from having any commerce with the natives.

The Malays are governed by feudal laws. A chief, who has the title of king or sultan, issues his commands to his great vassals, who have other vassals in subjection to them in a similar manner. A small part of the nation live independent, under the title of oranicai or noble, and sell their services to those who pay them best; while the body of the nation is composed of slaves, and live in perpetual servitude.

The country possessed by the Malays is in general very fertile. It abounds with odoriferous woods, such as the aloes, the sandal, and cassia. The ground is covered with flowers of the greatest fragrance, of which there is a perpetual succession throughout the year. There are abundance of mines of the most precious metals, said to be richer even than those of Brazil or Peru, and in some places are mines of diamonds. The sea also abounds with excellent fish, together with ambergrise, pearls, and those delicate birds-nests so much in request in China, formed in the rocks with the spawn of fishes and the foam of the sea, by a species of small-sized swallow peculiar to those seas. These are of such an exquisite flavour, that the Chinese for a long time purchased them for their weight in gold, and still buy them at an excessive price.

Notwithstanding all this plenty, however, the Malays are miserable. The culture of the lands, abandoned to slaves, is fallen into contempt. These wretched labourers, dragged incessantly from their rustic employments by their restless masters, who delight in war and maritime enterprises, have never time or resolution to give the necessary attention to the labouring of their grounds; of consequence the lands for the most part are uncultivated, and produce no kind of grain for the subsistence of the inhabitants. The sago tree indeed supplies in part the defect of grain. It is a species of the palm-tree, which grows naturally in the woods to the height of about 20 or 30 feet; its circumference being sometimes from five to six. Its ligneous bark is about an inch in thickness, and covers a multitude of long fibres, which being interwoven one with another envelope a mass of a gummy kind of meal. As soon as this tree is ripe, a whitish dust, which transpires through the pores of the leaves, and adheres to their extremities, indicates that the trees are in a state of maturity. The Malays then cut them down near the root, and divide them into several sections, which they split into quarters: they then scoop out the mass of mealy substance, which is enve-

loped by and adheres to the fibres; they dilute it in pure water, and then pass it through a straining bag of fine cloth, in order to separate it from the fibres. When this paste has lost part of its moisture by evaporation, the Malays throw it into a kind of earthen vessel of different shapes, where they allow it to dry and harden. This paste is wholesome, nourishing food, and preserves for many years.

MALACCA, the capital of the country of the same name, is situated in a flat country close to the sea. The walls and fortifications are founded on a solid rock, and are carried up to a great height; the lower part of them is washed by the sea at every tide, and on the land-side is a wide canal or ditch, cut from the sea to the river, which makes it an island. In 1641 it was taken from the Portuguese by the Dutch, since which time it has continued in their possession. In this city there are a great many broad streets; but they are very badly paved. The houses are tolerably well built, and some of them have gardens behind or on one side. The inhabitants consist of a few Dutch, many Malayans, Moors, Chinese, and other Indians, who are kept in awe by a fortress, which is separated from the city by a river, and by good walls and bastions, as well as by strong gates, and a drawbridge that is on the eastern side. The city is well situated for trade and navigation. Lon. 102. 2 E. Lat. 2. 12 N.

MALACCA BEAN. See ANACARDIUM ORIENTALE.

MALACHI, or the prophecy of Malachi, a canonical book of the Old Testament, and the last of the 12 lesser prophets. Malachi prophesied about 300 years before Christ, reproving the Jews for their wickedness after their return from Babylon, charging them with rebellion, sacrilege, adultery, profaneness, and infidelity; and condemning the priests for being scandalously careless in their ministry; at the same time not forgetting to encourage the pious few, who, in that corrupt age, maintained their integrity. This prophet distinctly points at the Messiah, who was suddenly to come to his temple, and to be introduced by Elijah the prophet, that is, John the Baptist, who came in the spirit and power of Elias or Elijah.

MALACHITE. (*malachites*, from μαλαχιτη, the mallow, so called in consequence of its resemblance to this plant.) A green copper ore, or carbonat of copper, exhibiting several varieties. See CUPRUM.

MALACHON, in botany, a genus of the class monadelphia, order polyandria. Calyx common, three-leaved, many-flowered, longer; arils five, one-seeded. Five species; herbs of the West Indies.

MALACHODENDRUM, in botany, a genus of the class monadelphia, order polyandria. Calyx simple; germ pear-shaped, pentagonal; styles five; capsules five; one-seeded. Two species: M. ovatum, and M. corchoroides, but neither of any note.

MALACHOLITE, in mineralogy, glassy actinolite; a species of actinotus. Found in the island of Sky in Scotland, near Allemort in Dauphigné, and in the Tyrolese mountains. See ACTINOTUS.

MALACHRA, in botany, a genus of the class monadelphia, order polyandria. Common calyx three-leaved, many-flowered; proper calyx campanulate, five-cleft; capsules five, one-seeded. Six species; natives of America.

MALACIA. (μαλαχια, from μαλαχιον, a ravenous fish.) In medicine, a term used by different writers in two senses, as importing ravenous longing generally, and a ravenous longing for unusual things. The last is the more common signification; and in this view it is synonymous with citta, pica, allotriophagia: and may be translated, depraved appetite, morbid desire of food. It is often found in chlorotic patients, not unfrequently in pregnant women, and occasionally in persons on recovery from severe illness.

It is in fact a species of cachexia, and the fancies are often very numerous and very extraordinary. They occasionally lead to a love of calcareous matter; but among the negroes any dirt is devoured, and such persons are called dirt-eaters. Sometimes the most disgusting substances are coveted. In general, however, the sound of brittle substances, as cinders or pipes between the teeth, seems to please as much as the taste; while even treading on cinders is apparently grateful. The immediate cause of this propensity is not known: the ultimate cause has been affirmed to be an absorption of acid, but this is erroneous, since the substances chiefly caused are not always nor indeed very generally antacid.

In pregnant women this disease is sometimes relieved by bleeding, and about the fourth month disappears.

MALACODERMATOUS. (μαλακος, soft, and δερμα, skin.) Soft-skinned. A term formerly applied in natural history to such animals as have a soft skin for their integument, in opposition to those that possess a horny, crustaceous, or testaceous covering.

MALACOPTERYGEOUS. (μαλακος, soft, and πτερυγιον, a fin.) A term applied to fishes which, like the carp genus, have bony fins, but with soft and harmless, instead of sharp and pointed extremities.

MALACOSTOMOUS. (μαλακος, soft, and στομα, the mouth.) In ichthyology, a term applied to those tribes of fishes, which like the carp, bream, tench, &c. have soft leathern mouths, and their teeth placed behind the jaws.

MALACOSTRACA, in entomology, a term employed by Aristotle and the Greek philosophers, to characterise crustaceous insects or worms, as distinguished from testaceous or ostracodermatous as he denominates them. Latreille, in his recent arrangement of crustaceous animals, has revived the term, and made it import a sub-class: this crustaceous class consisting of two divisions, malacostraca and entomostraca. See the article CRUSTACEA.

MA'LADY. *s.* (*maladie*, French.) A disease; a distemper; a disorder of body (*Spen.*).

MALÆ OS. (from *malus*, so called from its roundness.) The cheek-bone. See JUGALE OS.

MALAGA, an ancient, rich, and strong town of Spain, in the kingdom of Granada, with two castles, a bishop's see, and a good harbour, which renders it a place of considerable commerce. The advantage of this commerce, according to M. Bourgoanne, is entirely in favour of Spain, but almost without any to its navigation: of 842 vessels which arrived at this port in 1782, from almost every commercial nation, scarcely 100 were Spanish, even reckoning the ships of war which anchored there. The English, who are in possession of the greatest part of the trade, carry thither woollens and great quantities of small ware; the Dutch carry spice, cutlery ware, laces, ribbons, thread, &c. These nations, those of the north, and Italy, export to the amount of two millions and a half of piastres in wines, fruits, sumach, pickled anchovies, oil, &c. and all they carry thither amounts only to about a million and a half. The balance would be still more advantageous for Malaga if the silk and wool of the kingdom of Granada were exported from this port; but these are employed in the country where they are produced. The streets of Malaga are narrow, but there are some good squares; and the cathedral church is a superb building, said to be as large as St. Paul's. The only other building of note is the bishop's palace; which is a large edifice, but looks insignificant from its being situated near the other. Its prelate enjoys a revenue of 16,000l. sterling. It is seated on the Mediterranean, surrounded by hills, 70 miles W.S.W. of Granada. Lon. 4. 10 W. Lat. 36. 35 N.

MALAGMA. (from μαλασσω, to soften.) In medicine, an emollient poultice or cataplasm.

MALAGRIDA (Gabriel), an Italian jesuit, sent into Portugal as a missionary. He became so ambitious, that he joined the duke d'Aveiro in his conspiracy against the king of Portugal. When the jesuits were banished, he resided still in the kingdom, and there became a violent enthusiast, declaring himself the ambassador and immediate prophet of God. His extravagant conduct and his writings were at last noticed by the inquisition, and when he declared that the king's death had been revealed to him, he was condemned by the arbitrary tribunal, and was burnt alive, 1761, aged 75, as a false prophet.

MALALEUCA, the cayputi tree: a genus of the polyandria order, belonging to the polyadelphia class of plants. There is but one species, viz. the leucodendrum, a native of the East Indies and South-Sea islands. Mr. Forster relates that leucodendra were found in the island of New Caledonia: they were black at the root: but had a bark perfectly white and loose, with long narrow leaves like our willows. The leaves are extremely fragrant and aromatic; and Rumphius tells us, that from them the natives of the Moluccas make the oil called cayputi. This oil is commended as a nervous medicine, and as being useful in some cardialgies. The dose is four or five drops in some convenient liquor

MALANDERS. (*malandria*, from *malandare*, to go ill, Ital.) A disease to which horses are subject, and which consists in ulcerous chaps or chinks appearing on the inside of the fore-legs, just above the bend of the knee, and discharge a red, sharp, pungent humour. The disease may be cured by washing the part affected with strong stimulating lotions, so as to induce a secondary action upon the morbid affection; such as strong soap lather, urine, solution of corrosive sublimate, the strong mercurial ointment, or a lotion of sulphate of vitriol dissolved in water. The application should be continued till the scabs have completely fallen off. After which a few gentle purges should be administered twice a week.

MA'LAPERT. *a.* (*mal* and *pert.*) Saucy; quick with impudence (*Dryden*).

MA'LAPERTNESS. *s.* (from *malapert.*) Liveliness of reply without decency; quick impudence; sauciness.

MA'LAPERTLY. *ad.* (from *malapert.*) Impudently; saucily.

MALARMAT, in ichthyology, a species of trigla, with numerous cirri, and an octagonal body. See TRIGLA.

MALATIA, a town of Asiatic Turkey, in Aladulia, and a bishop's see; seated on the W. side of the Euphrates, 90 miles W.N.W. of Diarbekar. Lon. 37. 50 E. Lat. 37. 30 N.

MALARUM OSSA, in anatomy, the cheek-bones. See JUGULARE OS, and ANATOMY.

MALATS, in chemistry, salts produced by a full dose of malic acid upon a salifiable base. (See MALIC ACID.) This acid is obtained with difficulty, and hence the salts to which it gives rise have not been very extensively examined. The following are the chief results which have hitherto been obtained:

Malat of potass.
Malat of soda.
Malat of ammonia.

The salts were produced by Scheele; they are deliquescent, and very soluble.

*Malat of barytes.*—When the acid is dropped into barytic water, a white powder precipitates, which is the malat of barytes. According to Scheele, the properties of this salt resemble those of malat of lime.

*Malat of strontian.*—Malic acid occasions no precipitate in strontian water. Hence it follows that malat of strontian is more soluble than malat of barytes.

*Malat of lime.*—When the acid is neutralised with lime, it forms a salt scarcely soluble in water, which may be obtained in crystals by allowing the super malat of lime to evaporate spontaneously. Crystals of neutral malat are formed in the solution. But this acid has a strong tendency to combine in excess with lime, and to form a super malat of lime. This

salt is produced when carbonat of lime is thrown into malic acid, or into any liquid containing it. This super salt exists in various vegetables, especially the semper-vivum tectorum, and some of the sedums.

Super-malat of lime has an acid taste. It yields a precipitate with alkalies, sulphuric acid and oxalic acid. Lime water saturates the excess of acid, and throws down a precipitate of malat of lime. When the super-malat of lime is evaporated to dryness, it assumes exactly the appearance of gum-arabic; and if it have been spread thin upon the finger-nail, or upon wood, it forms a varnish. It is not so soluble in water as gum arabic, and the taste readily distinguishes the two. Super-malat of lime is insoluble in alkohol.

*Malat of magnesia.*—This salt is very soluble in water, and when exposed to the air deliquesces.

*Malat of alumina.*—This salt is almost insoluble in water. Of course it precipitates when malic acid is dropt into a solution containing alumina. Mr. Chevenix has proposed this acid to separate alumina from magnesia: which earths, as is well known, have a strong affinity for each other.

*To* MALA'XATE. *v. a.* (μαλαϛϖ.) To soften, or to knead to softness, any body.

MALAXA'TION. *s.* (from *malaxate.*) The act of softening.

MALAXIS, in botany, a genus of the class gynandria, order diandria. Nectary of one hollow, heart-shaped, erect leaf, embracing the organs of fructification: corol reversed. Three species: two common to Jamaica; one found in the marshes of our own country, with five-sided stem; leaves numerous, spatulate, rough at top; raceme many-flowered.

MALBROUK, in zoology, a species of simia or monkey, inhabiting Bengal, about a foot high, with a hoary pointed beard, grey face, large eyes, flesh-coloured eyelids; the forehead possessing a grey band instead of eyebrows; ears large, thin, flesh-coloured; body blackish; breast and belly white. See SIMIA.

MALDEN, a borough in Essex, with a market on Saturday; seated on an eminence, on the river Blackwater. It has two parish churches; and a third, which it had formerly, has been long converted into a free-school. Vessels of a moderate burden come up to the town, but large ships are obliged to unload at a distance below, in Blackwater bay. The custom of Borough-English is kept up here, by which the youngest son, and not the eldest, succeeds to the burgage tenure, on the death of his father. This town carries on a considerable trade, chiefly in corn, salt, coals, iron, deals, and wine. It is 10 miles E. of Chelmsford, and 37 N.E. of London.

MALDIVIA ISLANDS, a cluster of small islands in the Indian ocean, 500 miles southwest of the continent of the island of Ceylon. They are about 1000 in number, and are very small; extending from the second degree of south latitude to the seventh degree of north latitude. They are generally black low lands, surrounded by rocks and sands. The natives are of the same complexion with the Arabians, profess the Mahometan religion, and are subject to one sovereign. The channels between the islands are very narrow, and some of them are fordable. They produce neither rice, corn, nor herbage; but the natives live upon cocoanuts, and other fruits, roots, and fish. They have little or nothing to barter with, unless the shells called cowry, or blackmore's teeth, with which they abound: and these serve instead of small coin in many parts of India.

MALE, in natural history, that sex which is capable of generating, as the female is that which is capable of bearing and bringing forth. The generative organs in the male sex are for the most part placed exteriorly to the body, but not always: of which last kind the frog, and most fishes, furnish examples.

MALE. *a.* (*male*, French.) Of the sex that begets young; not female (*Swift*).

MALE, in composition, signifies ill.

MALE FERN, in botany. See FELIX.

MALE ORCHIS, in botany. See SATYRION.

MALE SPEEDWELL, in botany. See VERONICA.

MALE SCREW. See SCREW.

MALEADMINISTRA'TION. *s.* Bad management of affairs (*Ayliffe*).

MALEBRANCHE (Nicholas), an eminent French metaphysician, the son of Nicholas Malebranche, secretary to the French king, was born in 1638, and admitted into the congregation of the oratory in 1660. He at first applied himself to the study of languages and history: but afterwards meeting with Des Cartes's Treatise of Man, he gave himself up entirely to the study of philosophy. In 1699, he was admitted an honorary member of the Royal Academy of Sciences at Paris. Notwithstanding he was of a delicate constitution, he enjoyed a pretty good state of health till his death, which happened in 1715, at the age of 77. Father Malebranche read little, but thought a great deal. He despised that kind of philosophy which consists only in knowing the opinions of other men, since a person may know the history of other men's thoughts without thinking himself. He could never read ten verses together without disgust. He meditated with his windows shut, in order to keep out the light, which he found to be a disturbance to him. His conversation turned upon the same subjects as his books; but was mixed with so much modesty and deference to the judgment of others, that it was extremely and universally desired. His books are famous; particularly his Recherche de la Verité, i. e. Search after truth: his design in which is, to point to us the errors into which we are daily led by our senses, imagination, and passions; and to prescribe a method for discovering the truth, which he does, by starting the notion of seeing all things in God. And

hence he is led to think and speak merely of human knowledge, either as it lies in written books, or in the book of nature, compared with that light which displays itself from the ideal world; and, by attending to which, with pure and defecate minds, he supposes knowledge to be most easily had. The fineness of this author's sentiments, together with his fine manner of expressing them, made every body admire his genius and abilities; but he has generally passed for a visionary philosopher. Mr. Locke, in his examination of Malebranche's opinion of seeing all things in God, styles him "an acute and ingenious author;" and tells us, that there are "a great many very fine thoughts, judicious reasonings, and uncommon reflections in his Recherches." But Mr. Locke, in that piece, endeavours to refute the chief principles of his system. He wrote many other pieces besides that we have mentioned, all tending some way or other to confirm his main system, established in the Recherche, and to clear it from the objections which were brought against it, or from the consequences which were deduced from it; and if he has not attained what he aimed at in these several productions, he has certainly shown great abilities and a vast force of genius.

MALECONTENT. MALECONTE'NTED. *a.* (*male* and *content.*) Discontented; dissatisfied (*Shakspeare*).

MALECONTE'NTEDLY. *ad.* (from *malecontent.*) With discontent.

MALECONTE'NTEDNESS. *s.* (from *malecontent.*) Discontentedness; want of affection to government (*Spectator*).

MALEDI'CTED. *a.* (*maledictus*, Latin.) Accursed.

MALEDI'CTION. *s.* (*malediction*, Fr.) Curse; execration; denunciation of evil (*Wotton*).

MALEFA'CTION. *s.* (*male* and *facio*, Lat.) A crime; an offence (*Shakspeare*).

MALEFA'CTOR. *s.* (*male* and *facio*, Latin.) An offender against law; a criminal (*Roscommon*).

MALE'FICK. MALE'FIQUE. *a.* (*maleficus*, Latin.) Mischievous; hurtful.

MALEPRA'CTICE. *s.* (*male* and *practice.*) Practice contrary to rules.

MALESHERBES (Christian William Lamoignon), a celebrated Frenchman, born at Paris, 1721, and brought up to the bar. He for 25 years was zealously engaged in the service of his country, in supporting and invigorating the industry of her inhabitants, as president of the court of aides; and after he had retired to his estate, he was recalled in 1775, by Louis XVI. to become the minister of the interior. The prisons were now visited, and no longer contained any but criminals who had violated the law; various employments recommended habits of industry, and the apartments were rendered more commodious for the unfortunate captives. The retirement of Turgot was attended by that of his friend Malesherbes, who now travelled under an assumed name, and in a plain dress, over France, Switzerland, and Holland, and in examining the various manufactures, curiosities, and arts of each province. He hailed the revolution as the forerunner of blessings, but soon saw his hopes vanish; yet while others fled he boldly appeared before the convention; and actuated by gratitude, he no sooner saw his sovereign dragged as a criminal before his subjects, than he demanded the privilege and the honour of being his defender. The heroic conduct of this venerable man had no effect on the bloody convention. His appeals in favour of Louis were of no avail, and he was the first to announce to the unfortunate monarch the ill success of his defence. So much goodness ought to have met respect among a civilized nation, but otherwise. No sooner was his daughter accused of treason and hurried to prison, than the aged father requested to accompany his beloved child. The request was granted, and in a few days, alas! he appeared with her and her child before the revolutionary tribunal, and with her and her child he ascended the scaffold, 1793. He was author of a treatise on rural economy—thoughts and maxims—two memoirs on the civil state of the protestants.

MALE'VOLENCE. *s.* (*malevolentia*, Lat.) Ill-will; inclination to hurt others; malignity (*Shakspeare*).

MALE'VOLENT. *a.* (*malevolus*, Latin.) Ill-disposed towards others; malignant (*Dry.*).

MALE'VOLENTLY. *ad.* Malignly; malignantly; with ill-will (*Howel*).

MALHERBE (Francis de), a French poet, who, according to Bayle and Boileau, formed the taste of his countrymen in matters of polite literature, and introduced, with purity of language, harmonious numbers, and a just cadence. He was born at Caen about 1555, and died at Paris, 1628. He was patronised by Henry the Great and Mary de Medicis. Though an elegant writer, he composed verses with great labour. His works, divided into six books, consist of paraphrases on the psalms, odes, sonnets, and epigrams.

MALIC ACID. (from *malum*, an apple.) An acid obtained by saturating the juice of apples with alkali, and pouring in the acetous solution of lead until it occasions no more precipitate. The precipitate is then to be edulcorated, and sulphuric acid poured upon it until the liquor has acquired a fresh acid taste, without any mixture of sweetness. The whole is next to be filtered, in order to separate the sulphate of lead. The filtered liquor is the malic acid, which is very pure, remains always in a fluid state, and cannot be rendered concrete.

This acid exists also in common house-leek, and some sedums combined with lime, and may be obtained from them by the above means.

It may likewise be formed by the action of nitric acid on sugar. If nitric acid be distilled with an equal quantity of sugar, till the mixture assumes a brown colour (which is a sign that all the nitric acid has been abstracted

from it), this substance will be found of an acid taste; and after all the oxalic acid, which may have been formed, is separated by lime-water, there remains another acid, which may be obtained by the following process: saturate it with lime and filter the solution; then pour upon it a quantity of alkohol, when a coagulation will take place. This coagulum is the acid combined with lime. Separate it by filtration, and edulcorate it with fresh alkohol: then dissolve it in distilled water, and pour in acetat of lead till no more precipitation ensues. The precipitate is the acid combined with lead, from which it may be separated by diluted sulphuric acid.

Malic acid, thus obtained, is a liquid of a reddish brown colour and a very acid taste. When evaporated it becomes thick and viscid like a mucilage or syrup, but it does not crystallize. When exposed to a dry atmosphere, in thin layers, it dries altogether, and assumes the appearance of varnish. When heated in the open fire it becomes black, swells up, exhales an acrid fume, and leaves behind it a very voluminous coal. When distilled the products are an acid water, a little carburated hydrogen gass, and a large proportion of carbonic acid. It is very soluble in water. It gradually decomposes spontaneous by undergoing a kind of fermentation in the vessels in which it is kept. Sulphuric acid chars it, and nitric acid converts it into oxalic acid. Hence it is evident that it is composed of oxygen, hydrogen, and carbon, though the proportions of these substances have not been ascertained.

Malic acid combines with alkalies, earths, and metallic oxyds, and forms salts known by the name of MALATS, which see.

Its affinities have not yet been ascertained.

This acid bears a strong resemblance to the citric; but differs from it in the following particulars:

1. The citric acid shoots into fine crystals, but the malic does not crystallize. 2. The salt formed from the citric acid with lime is almost insoluble in boiling water; but the salt made with lime and the malic acid is readily soluble in boiling water. 3. Malic acid precipitates mercury, lead, and silver, from the nitrous acid; and also the solution of gold when diluted with water: but citric acid produces no effect upon any of these solutions. 4. Malic acid seems to have a less affinity for lime than citric acid has; for when a solution of lime in the former is boiled a minute, with a salt formed from volatile alkali and citric acid, a decomposition takes place, and the latter acid combines with the lime and is precipitated.

MA'LICE. *s.* (*malice*, French.) 1. Badness of design; deliberate mischief (*Taylor*). 2. Ill-intention to any one; desire of hurting (*Shakspeare.*)

*To* MA'LICE. *v. a.* (from the noun.) To regard with ill-will: obsolete (*Spenser*).

MALICE, in ethics and law, is a formed design of doing mischief to another; it differs from hatred. In murder, it is malice makes the crime; and if a man, having a malicious intent to kill another, in the execution of his malice kills a person not intended, the malice shall be connected to his person, and he shall be adjudged a murderer. The words *ex malitia præcogitata* are necessary to an indictment of murder, &c. And this *malitia præcogitata*, or *malice prepense*, may be either express or implied in law. Express malice is, when one, with a sedate, deliberate mind, and formed design, kills another; which formed design is evidenced by external circumstances discovering that intention; as lying in wait, antecedent menaces, former grudges, and concerted schemes to do him some bodily harm. Besides, where no malice is expressed, the law will imply it; as where a man wilfully poisons another, in such a deliberate act the law presumes malice, though no particular enmity can be proved. And if a man kills another suddenly, without any, or without a considerable provocation, the law implies malice; for no person, unless of an abandoned heart, would be guilty of such an act upon a slight or no apparent cause.

MALI'CIOUS. *a.* (*malicieux*, French.) Ill-disposed to any one; intending ill; malignant (*Shakspeare*).

MALI'CIOUSLY. *ad.* With malignity; with intention of mischief (*Swift*).

MALI'CIOUSNESS. *s.* Malice; intention of mischief to another (*Herbert*).

MALI'GN. *a.* (*maligne*, French.) 1. Unfavourable; ill-disposed to any one; malicious (*South*). 2. Infectious; fatal to the body; pestilential (*Bacon*).

*To* MALI'GN. *v. a.* (from the adjective.) 1. To regard with envy or malice (*South*). 2. To mischief; to hurt; to harm.

MALI'GNANCY. *s.* (from *malignant.*) 1. Malevolence; malice; unfavourableness (*Shak.*). 2. Destructive tendency (*Wiseman*).

MALI'GNANT. *a.* (*malignant*, French.) 1. Malign; envious; unpropitious; malicious; mischievous (*Watts*). 2. Hostile to life: as, *malignant* fevers (*Dryden*).

MALI'GNANT. *s.* 1. A man of ill intention malevolently disposed (*Hooker*). 2. It was a word used for the defenders of the church and monarchy by the rebel sectaries in the civil wars.

MALIGNANT, in medicine, a term applied to fevers accompanied with a considerable degree of danger: usually from approaching or threatening putridity; in which last case the signs are a slight coldness and shivering, quickly followed by a great loss of strength, a small, rapid, and contracted pulse, faintness, if in an erect posture, drowsiness without sleep, or the sleep not refreshing, but followed by a greater prostration of strength, and delirium. There is little pain, thirst, or other troublesome symptom, and yet the patient is uneasy; the features are contracted and sunk; the extremities become cold, the pulse intermits, and death soon terminates the scene.

MALI'GNANTLY. *ad.* (from *malignant.*) With ill intention; maliciously; mischievously.

MALI'GNER. *s.* (from *malign.*) 1. One who regards another with ill-will (*Swift*). 2. Sarcastical censurer (*Glanville*).

MALI'GNITY. *s.* (*malignité*, French.) 1. Malice; maliciousness (*Tickel*). 2. Contrariety to life; destructive tendency. 3. Evilness of nature (*South*).

MALI'GNLY. *ad.* (from *malign.*) Enviously; with ill-will; mischievously (*Pope*).

MALIS, in medicine, cocyta; a pungent pain from an animalcule lodged in an ulcerous tumour; or pain from an insect lodged in any part without ulcer or tumour. The insects which produce this pain are various. In Persia it proceeds from the gordius, vena medinensis or dracunculus: in America from the pulex: and in Europe it is sometimes produced by the pediculus.

MA'LKIN. *s.* (*mal*, of *Mary*, and *kin.*) A kind of mop made of clouts for sweeping ovens; thence a frightful figure of clouts dressed up; thence a dirty wench (*Shakspeare*).

MALL. *s.* (*malleus*, Lat. a hammer.) 1. A kind of beater or hammer (*Addison*). 2. A stroke; a blow: not in use (*Hudibras*). 3. A walk where they formerly played with malls and balls (*Pope*).

*To* MALL. *v. a.* (from the noun.) To beat or strike with a mall.

MALL, in ornithology. See LARUS.

MALLAM-TODDALI, in botany, the celtis orientalis of the species plantarum, No. 1478: a Malabar tree, whose root, bark, leaves, and fruit, were formerly esteemed specifics in the epilepsy. See CELTIS.

MALLARD, in ornithology. See ANAS.

MALLEABILITY, in metallurgy, the property which various metals possess of being extended under the hammer into thin plates without cracking, and which gives rise to a peculiar division of metals in many systems of chemistry and mineralogy. The principal metals whose malleability has been hitherto determined are the following:

| | |
|---|---|
| Gold. | Osmium. |
| Platina. | Copper. |
| Silver. | Iron. |
| Mercury. | Nickel. |
| Palladium. | Tin. |
| Rhodium. | Lead. |
| Iridium. | Zinc. |

MA'LLEABLE. *a.* (*malleable*, Fr. from *malleus*, Latin, a hammer.) Capable of being spread by beating (*Newton*).

MA'LLEABLENESS. *s.* (from *malleable.*) Quality of enduring the hammer; malleability; ductility (*Locke*).

MALLEAMOTHE, in botany, pavetta Indica, pavette, Spec. Plant. 160: a Malabar shrub. The leaves boiled in palm-oil are employed as a cure in impetigo: the root powdered and mixed with ginger is said to be diuretic.

*To* MA'LLEATE. *v. a.* (from *malleus*, Lat.) To hammer (*Derham*).

MALLEI ANTERIOR, in anatomy. See LAXATOR TYMPANI.

MALLEI EXTERNUS, in anatomy. See TENSOR TYMPANI.

MALLENDERS. See MALENDERS.

MALLEOLI, in the ancient art of war, were bundles of combustible materials, set on fire to give light in the night, or, to annoy the enemy; when they were employed for the latter purpose they were shot out of a bow, or fixed to a javelin, and thus thrown into the enemies engines, ships, &c. in order to burn them. Pitch was always a principal ingredient in the composition. The malleoli had also the name of pyroboli.

MALLEOLUS. (diminution of *malleus*, a mallet, so called from its supposed resemblance.) In anatomy, the ankle, distinguished into external and internal, or malleolus externus and internus.

In botany, the same term is applied to the cuttings of vines with joints of the old wood at their bottom, resembling a little mallet.

MALLET, a large kind of hammer made of wood; much used by artificers who work with a chisel, as sculptors, masons, and stonecutters, whose mallet is ordinarily round; and by carpenters, joiners, &c. who use it square. There are several sorts of mallets used for different purposes on ship-board. The calking mallet is chiefly employed to drive the oakum into the seams of a ship, where the edges of the planks are joined to each other in the sides, deck, or bottom. The head of this mallet is long and cylindrical, being hooped with iron to prevent it from splitting in the exercise of calking. There is also the serving mallet, used in serving the rigging, by binding the spun-yarn more firmly about it than it could possibly be done by hand, which is performed in the following manner: the spun-yarn being previously rolled up in a large ball or clue, two or three turns of it are passed about the rope, and about the body of the mallet, which for this purpose is furnished with a round channel in its surface, that conforms to the convexity of the rope intended to be served. The turns of the spun-yarn being strained round the mallet, so as to confine it firmly to the rope, which is extended above the deck, one man passes the ball continually about the rope, whilst the other, at the same time, winds on the spun-yarn by means of the mallet, whose handle acting as a lever strains every turn about the rope as firm as possible.

MALLET, or MALLOCH (David), an English poet, but a Scotsman by birth, was born in that country about 1700. By the penury of his parents, he was compelled to be janitor of the high school at Edinburgh; but he surmounted the disadvantages of his birth and fortune; for when the duke of Montrose applied to the college of Edinburgh for a tutor to educate his sons, Malloch was recommended. When his pupils went abroad, they were intrusted to his care; and having conducted them through their travels, he returned with them to London. Here, residing in their family, he naturally gained admission to persons

of high rank and character, and began to give specimens of his poetical talents. In 1733, he published a poem on verbal Criticism, on purpose to make his court to Pope. In 1740, he wrote a Life of Lord Bacon, which was then prefixed to an edition of his works; but with so much more knowledge of history than of science, that, when he afterwards undertook the Life of Marlborough, some were apprehensive lest he should forget that Marlborough was a general, as he had forgotten that Bacon was a philosopher. The old duchess of Marlborough assigned in her will this task to Glover and Mallet, with a reward of 1000l. and a prohibition to insert any verses. Glover is supposed to have rejected the legacy with disdain, so that the work devolved upon Mallet; who had also a pension from the late duke of Marlborough to promote his industry, and who was continually talking of the discoveries he made, but left not when he died any historical labours behind. When the prince of Wales was driven from the palace, and kept a separate court by way of opposition, to increase his popularity by patronizing literature, he made Mallet his under secretary, with a salary of 200l. a year. Thomson likewise had a pension; and they were associated in the composition of the Masque of Alfred, which in its original state was played at Cliefden in 1740. It was afterwards almost wholly changed by Mallet, and brought upon the stage of Drury-lane in 1751, but with no great success. He had before published two tragedies; Eurydice, acted at Drury-lane in 1731; and Mustapha, acted at the same theatre in 1739. It was dedicated to the prince his master, and was well received, but never was revived. His next work was Amyntor, and Theodora (1747), a long story in blank verse; in which there is copiousness and elegance of language, vigour of sentiment, and imagery well adapted to take possession of the fancy. In 1753, his masque of Britannia was acted at Drury-lane, and his tragedy of Elvira in 1763; in which year he was appointed keeper of the book of entries for ships in the port of London. In the beginning of the last war, when the nation was exasperated by ill success, he was employed to turn the public vengeance upon Byng, and wrote a letter of accusation under the character of a Plain Man. The paper was with great industry circulated and dispersed; and he for his seasonable intervention had a considerable pension bestowed upon him, which he retained to his death. Towards the end of his life he went with his wife to France; but after a while, finding his health declining, he returned alone to England, and died in April 1765. He was twice married, and by his first wife had several children. One daughter, who married an Italian of rank named Cilesia, wrote a tragedy called Almida, which was acted at Drury-lane. His second wife was the daughter of a nobleman's steward, who had a considerable fortune, which she took care to retain in her own hands.

MALLET (Edme) was born at Melun in 1713, and enjoyed a curacy in the neighbourhood of his native place till 1751, when he went to Paris to be professor of theology in the college of Navarre, of which he was admitted a doctor. Boyer, the late bishop of Mirepoix, was at first much prejudiced against him; but being afterwards undeceived, he conferred upon him the see of Verdun as a reward for his doctrine and morals. Jansenism had been imputed to him by his enemies with this prelate; and the gazette which went by the name of Ecclesiastical, accused him of impiety. Either of these imputations was equally undeserved by the Abbé Mallet: as a Christian, he was grieved at the disputes of the French church; and as a philosopher, he was astonished that the government had not from the very beginning of those dissentions imposed silence on both parties. He died at Paris in 1755, at the age of 42. The principal of his works are, 1. Principes pour la lecture des Poetes, 1745, 12mo. 2 vols. 2. Essai sur l' Etude des Belles-Lettres, 1747, 12mo. 3. Essai sur les bienseances oratoires, 1753, 12mo. 4. Principes pour la lecture des Orateurs, 1753, 12mo. 3 vols. 5. Histoire des Guerres civiles de France sous les regnes de Francois II. Charles IX. Henri III. & Henri IV. translated from the Italian of d'Avila. In Mallet's works on the Poets, Orators, and the Belles-Lettres, his object is no more than to explain with accuracy and precision the rules of the great masters, and to support them by examples from authors ancient and modern. The style of his different writings, to which his mind bore a great resemblance, was neat, easy, and unaffected. But what must render his memory estimable, was his attachment to his friends, his candour, moderation, gentleness, and modesty. He was employed to write the theological and belles-lettres articles in the Encyclopédie; and whatever he wrote in that dictionary was in general well composed. Abbé Mallet was preparing two important works when the world was deprived of him by death. The first was Une Histoire generale de nos Guerres depuis le commencement de la Monarchie; the second, Une Histoire du Concile de Trente, which he intended to set in opposition to that of Father Paul translated by Father le Courayer.

MALLEUS. (*malleus*, a hammer, so called from its supposed resemblance.) In anatomy, a bone of the internal ear. It is distinguished into a head, neck, and manubrium. The head is round, and encrusted with a thin cartilage, and annexed to another bone of the ear, the incus, by the junction called ginglymus. (See ANATOMY.) Its neck is narrow, and situated between the head and manubrium or handle; a long process issues from it, adheres to a furrow in the auditory canal, and is continued as far as the fissure in the articular cavity of the temporal bone. The manubrium or handle is terminated by an enlarged extremity, and connected to the membrana tympani by a short conoid process.

MALLICOLLO, one of the largest of the New Hebrides, in the Pacific Ocean. It extends 20 leagues from N. to S. Its inland mountains are very high, and clad with forests. Its vegetable productions are luxuriant, and in great variety; cocoa-nuts, bread-fruit, bananas, sugar-canes, yams, eddoes, turmeric, and oranges. Hogs and common poultry are the domestic animals. The inhabitants appear to be of a race totally distinct from those of the Friendly and Society Islands. Their form, language, and manners, are widely different. They seem to correspond in many particulars with the natives of New Guinea, particularly in their black colour and woolly hair. They go almost naked, are of a slender make, have lively, but very irregular ugly features, and tie a rope fast round their belly. They use bows and arrows as their principal weapons, and the arrows are said to be sometimes poisoned. They keep their bodies entirely free from punctures, which is one particular that remarkably distinguishes them from the other tribes of the Pacific Ocean. Lon. 167. 45 E. Lat. 16. 15 S.

MALLING (West), a town in Kent, with a market on Saturday, six miles W. of Maidstone, and thirty E. by S. of London. Lon. 0. 33 E. Lat. 51. 20 N.

MALLINGTONIA, in botany, a genus of the class didynamia, order angiospermia. Calyx with a five-toothed reflected margin; corol with a very long tube, and four-cleft border; anthers two-parted, sheathing; silique doubtful. One species; a very large tree, with terminal panicle, and white odorous corol; propagated in our gardens, but its native climate unknown.

MALLOW, in botany. See MALVA.

MALLOW (Bastard). See MALOPE.

MALLOW (Jew's). See CORCORUS.

MALLOW (Indian). See SIDA.

MALLOW (Marsh). See ALTHÆA.

MALLOW (Musk). See HIBISCUS.

MALLOW (Rose). See ALCEA.

MALLOW (Syrian). See HIBISCUS.

MALLOW TREE. See LAVATERA.

MALLOW (Venice). See HIBISCUS.

MALLOW, a town of Ireland, in the county of Cork, seated on the Blackwater, 17 miles N. of Cork. Lon. 8. 32 W. Lat. 52. 10 N.

MALMEDY, a town of the Netherlands, in the bishopric of Liege, with an abbey. It was taken by the French in 1794. It is seated on the Recht, nine miles S. of Limburg. Lon. 6. 2 E. Lat. 50. 18 N.

MALMISTRA, an ancient town of Natolia, with an archbishop's see; seated at the mouth of a river of the same name, which divides it into the Old and New Town. It is 30 miles S.E. of Terasso. Lon. 36. 15 E. Lat. 36. 50 N.

MALMOE, a seaport of Sweden, in the province of Schonen, with a large harbour and a strong citadel. It is seated on the Sound, 15 miles S.E. of Copenhagen. Lon. 13. 7 E. Lat. 53. 38 N.

MALMSAS, a town of Sweden, in the province of Sudermania, 23 miles W.N.W. of Nikoping.

MALMSBURY, an ancient borough in Wiltshire, with a market on Saturday. In the church, which was formerly an abbey church, is the monument of king Arthur, who was buried under the high altar. Malmsbury has a considerable trade in the woollen manufacture, and sends two members to parliament. It is seated on a hill, almost surrounded by the Avon, over which it has six bridges, 26 miles E. by N. of Bristol, and 95 W. of London. Lon. 2. 0 W. Lat. 53. 34 N.

MALMSEY, or MALVASY, a rich luscious kind of wine brought from Greece to Candia; so called from Malvasia, a city in Peloponnesus, the ancient Epidaurus, whence this celebrated liquor was first brought.

That brought from Candia is now esteemed the best.

MALMSEY, or MALVISY, is also the name of a kind of muscadine wine brought from Provence.

MALO (St.), a seaport of France, in the department of Morbian, and lately an episcopal see. It has a large harbour, difficult of access, on account of the rocks that surround it; and is a trading place of great importance, defended by a strong castle. It was bombarded by the English in 1693, but without success. In 1758, they landed in Cancalle Bay, went to the harbour by land, and burnt above 100 ships. St. Malo is seated on an island, united to the mainland by a causeway, 17 miles N.W. of Dol, and 205 W. of Paris. Lon. 1. 57 W. Lat. 48. 39 N.

MALORIA, a small island of Italy, on the coast of Tuscany, 10 miles W. of Leghorn. Lon. 10. 4 E. Lat. 43. 34 N.

MALPARTIDO, a town of Spain, in Estremadura, 14 miles S. of Placentia. Lon. 5. 30 W. Lat. 39. 36 N.

MALPAS, a town in Cheshire, with a market on Monday; seated on a high eminence, near the river Dee, 15 miles S.E. of Chester, and 166 N.W. of London. Lon. 2. 45 W. Lat. 53. 2 N.

MALPIGHI (Marcello), an eminent Italian physician and anatomist in the 17th century. He studied under Massari and Mariano. The duke of Tuscany invited him to Pisa, to be professor of physic there. In this city he contracted an intimate acquaintance with Borelli, to whom he ascribed all the discoveries he had made. He went back to Bologna, the air of Pisa not agreeing with him. Cardinal Antonio Pignatelli, who had known him while he was legate at Bologna, being chosen pope in 1691, under the name of Innocent XII. immediately sent for him to Rome, and appointed him his physician. But this did not hinder him from pursuing his studies, and perfecting his works, which have immortalized his memory. He died in 1694; and his works, with his life written by himself prefixed, were first collected and printed at London, in folio, 1667.

MALPIGHIA, in botany, so named in ho-

nour of the preceding Marcello Malpighi, professor of medicine at Bologna, a genus of the decandria trigynia class and order. Natural order of trihilatæ. Malpighiæ, Jussieu. Essential character: calyx five-leaved, with melliferous pores on the outside at the base; petals five, roundish, with claws; berry one-celled, three-seeded. There are eighteen species, of which M. glabra, smooth-leaved Barbadoes cherry, usually grows to the height of sixteen or eighteen feet; leaves opposite, subsessile, acute, continuing all the year; flowers in axillary and terminating bunches; the pedicles have a single joint; calyx incurved with glands; petals subcordate; stigmas simple, with a little drop; fruit red, round, the size of a cherry. This tree grows plentifully in most of the islands in the West Indies; whether it is natural there or not is difficult to determine, for birds being fond of the fruit, they disperse the seeds every where in great abundance.

MALPLAQUET, a village of Austrian Hainault, seven miles S. by E. of Mons. It is famous for a victory gained over the French, by the duke of Marlborough, in 1709, and sometimes called the Battle of Blaregnies, from an adjacent village.

MALSESENA, a town of Italy, in the Veronese, 18 miles N.N.W. of Verona.

MALT, a term applied to grain which has been made to germinate artificially to a certain extent, after which the process is stopped by the application of heat; thus fitting it for making a potable liquor under the denomination of beer or ale. See BREWING.

A report has been lately published by Mr. John Carr, on the sprinkling of malt on the floor, which is recommended by the commissioners of excise to the lords of the treasury. An abridgment of this report has been published in the Retrospect of Philosophical Discoveries, of which we shall avail ourselves in the present article.

As a correct knowledge of that part of the process of malting wherein nature is principally employed is the foundation of all reasoning upon the subject, Mr. Carr gives the following as probably the true theory of malting.

The barley grain consists of the germ comprising both the plumula (acrospire) and the radicle; and of a portion of farinaceous matter, intended to be converted into saccharine matter by germination. When the grain is made moist and warm, it imbibes the heat and moisture, and swells greatly. The radicle it most susceptible of this enlargement, and also attracts the oxygen of the atmosphere, which, after depositing heat on entering into combination with the farinaceous substance of the grain, converts this substance into saccharine matter. The radicle soon pierces the husk of the grain, and throws out fibres that elongate downwards. At the same time the acrospire, invigorated by the heat produced from the combination of the oxygen, slowly advances through the body of the grain, and piercing the opposite end, shoots up into a green blade, leaving the empty husk behind it.

The most important part in the manipulation of malting consists in the nice adjustment and due regulation of the heat generated in the process. And as the formation of saccharine matter is progressive, and the grain is ulteriorly totally deprived of it, it is necessary to seize the proper time to stop the germination of the corn, by throwing it upon the kiln, in order to procure the greatest proportion of saccharine matter.

Mr. Reynoldson asserts, that the saccharine matter exists ready formed in the barley, and that malting only developes it; but this is so contrary to the fact as not to require any refutation.

Malting, therefore, is only the promotion of a healthy germination of barley up to that period when the largest proportion of saccharine matter has been formed. As in every natural process a variation of the means will necessarily cause a difference in the product, the great difference in the process, when watering is used, or not, must render the quality of the malt in one case superior to the other.

If grain throws out too much root, the substance will be exhausted, and the malt light and unproductive. Hence the process which fully malts the barley with the least possible root is the best, and it is well known that the Hertfordshire method of not watering the corn on the floor produces only a short and small radicle. The other method of watering the corn throws out a much larger root, which being afterwards burnt off on the kiln, becomes mere waste, and is the cause why malt, forced as it were by watering, is lighter and less productive than when made by the Hertfordshire method.

Maltsters commonly suppose that the grain becomes malted just so far as the acrospire penetrates the grain, and that the unpenetrated part remains barley; but the evidence of Messrs. King and Clough sufficiently established that the best malt is made when the acrospire proceeds only two thirds through the grain. In fact, the radicle is the efficient organ in malting the barley, while the acrospire simply feeds on it; so that in the Hertfordshire method, where the corn is constantly kept cool, the growth of the acrospire is sufficiently slow and gradual to allow the radicle to malt the whole substance of the grain, though the acrospire has not proceeded all through the barley: whereas, in forcing the grain by watering it, the acrospire is driven rapidly forward, and being insoluble in the process of brewing, it contributes to waste the malt.

Malt made by watering weighs from 15 to 20 pounds in four bushels less than an equal measure of malt that has not been watered. And watered malt affords only 64 pounds of extract, while unwatered malt yielded 84 pounds from the same quantity.

An excess and fluctuation of heat are certainly highly injurious to the regular progress of vegetation. When there is no increase of moisture after the corn leaves the cistern, an equable temperature can be preserved with much certainty; but when the floors are

watered, this equable temperature cannot be kept up, an unequal vegetation takes place, the moisture is evaporated, and the heat again renders water indispensable.

This heat improperly rising to excess in the young floors, is the true cause of what is termed flinty malt. The flint consists of little hard knobs in the grain, which are insoluble. The heat occasions the glutinous mucilage of the barley to run into a clammy substance, somewhat like birdlime, which hardens on the kiln.

As the agents of the watering party deny their process to be the cause of flint, so do they assert that they can make malt of superior flavour by sprinkling the grain; but certainly that malt which is worked in the most pure, clean, and natural manner, will be the most free from any adventitious flavour. In watering on the floors the grain is turned immediately after it has been sprinkled; hence the wet corn is placed at the bottom, and some of this will again be thrown undermost in the subsequent turnings, and become mouldy. The disgusting taste of these grains infects all those in contact with them, and materially affects the flavour of the beer.

To mix the coarsest and heaviest barleys with the very finest in the same cistern, would certainly be improper. It appears, indeed, that thick-skinned corn requires to remain a few hours longer in the cistern; but Messrs. Clough and King have fully established, that better malt can be made from coarse barley without watering it, than by sprinkling it. The agents of the watering party are equally mistaken in asserting, that although the plump barleys of the south may be malted without being watered, the inferior corn from the north requires sprinkling. But it is well known that the inferior barleys are apt to run themselves out by too quick a vegetation, and yet they cannot, from their lightness, allow any part of their substance to be lost in the process of malting.

There are only three varieties of malt, viz. brown, amber, and pale malt. The two first are peculiar to porter brewing, to communicate flavour and colour. The third is the basis of porter, and all other malt liquor. Brown malt is made on the kiln, by what is called blowing. It is spread very thin, and a quick heat is passed through it from blazing faggots, which blows up the husk, and renders the grains large and hollow, with an increase of measure, of one or two bushels in a quarter. The use of this malt is rapidly declining. Amber malt is a variety between brown and pale malt, and is made by giving it less fire than the former, and more than the latter. It is still generally used in porter along with pale malt, but the quantity made is inconsiderable.

If the vegetation of the grain has been imperfect, the product will be partly malt and partly barley, and of course heavier than good malt. If the vegetation has been carried too far, much of the substance of the malt will be driven out, and the malt will be proportionably light. This is so well known in the markets, that the buyers of malt usually govern themselves, as to the price, by the weight which a certain measure of the sample yields In this respect, Hertfordshire malt preserves a distinguished superiority over watered malt.

There are no frauds of any extent practicable at a malthouse, except those which are immediately connected with the practice of watering the corn on the floors. A cautious and artful maltster may defraud the revenue of half the duty which he ought to pay, and yet incur very little risk of detection, provided he is indulged with watering the short wet corn on the floors.

The revenue upon malt can only be protected from very extensive depredation, and the quality of the commodity preserved from a most improvident waste, by the restriction against watering on the floors being extended from its present period of nine to twelve days, for a very material circumstance was overlooked when the present restriction was established, viz. that when short wet corn is fraudulently laid upon the floors, it does not take the true age of its being removed from the cistern, but a false age of the date of the preceding steeping, either from its being mixed with the youngest floor, or passing for it in the officer's account. In this way three days of false age can be readily gained, and the corn watered on the seventh instead of the tenth day. But on the old restriction of twelve days, the short wet corn could not be worked up to that period without watering it, by which the penalty was risked, and the officer's attention excited.

This statement of the theory of malting was confirmed by visiting all the principal malthouses in England, and conversing with the oldest labourers as well as with their masters.

In Hertfordshire, and in the northern direction from London, where malt is made without watering, 115 malthouses were visited. The corn was usually kept under water, from 48 to 56 hours, according to the weather. When thrown out of the cistern, it remains in the couch from 26 to 30 hours, and it is kept for a day longer at a depth of 10 to 16 inches. The increase of temperature is carefully watched, and checked by turning the grain. By the fourth day, the root has come freely out, and the corn is spread very thin, so that the temperature is but a little above that of the air. It is worked in this manner up to the eighth or ninth day. The root in the mean while turns back, and forms a little bushy knot of fibres, which rarely exceeds half an inch in length. To promote the growth of the acrospire, the grain is then laid a little deeper, and so gradually increased up to the kiln, when the acrospire has reached two-thirds, or at most three-fourths of the grain. The old floors were fresh, sound, and in healthy vegetation; even where the grain had been some time on the kiln, the moisture flying off in a dense vapour shewed that the barley had carried with it from the cistern a sufficiency of water for the purpose of completely malting it. The malthouses were kept remarkably open, and yet the cistern water was not expended by evaporation. The coolness of the floors was avowedly to prevent the corn from sweating out the cistern water, and to keep back the vegetation.

The brewers, some of whom were also maltsters, asserted that they could draw upwards of half a barrel more wort, of equal goodness, from a quarter of unwatered malt than from watered. The usual quantity was three barrels and a half to a quarter of malt. Scarce any of the porter malts were in preparation.

About 60 malthouses were visited in Surrey and the country west of London, where the corn is usually watered on the floors. For the first three days after the barley is thrown out of the cistern, it is kept 16 or 18 inches deep, and sweats very much, throwing out a long root. It is then spread out very thin, to carry off the remainder of the cistern water by evaporation, which checks the vegetation, so that on the ninth day the root is frequently flaccid and brown. As soon as the nine days of restriction are expired, the corn is watered, at three separate sprinklings, turning over the corn each time, and leaving it undisturbed from 12 to 18 hours. In some cases the operation is repeated. A second root is thus thrown out, by the side of the old one, which last is purposely beat off in turning. This new root increases the measure of the malt, and with the same view the acrospire is frequently driven much beyond the end of the grain; but the length of the acrospire was very various. In many floors the corn was run together in hard bunchy knots, by the fibres of the roots matting together. Many also of the floors were mouldy, or, as they term it, finnery. The malthouses were much larger than those in Hertfordshire, but kept much closer, which is no doubt one of the causes of the malt becoming mouldy. The use of watering is held to be an increase of measure, which in one instance was said to be two bushels in twenty. The brewers, and a maltster who made chiefly for a considerable brewery, made their malt without watering it.

At many of these houses the frauds of short wetting had been extensively practised, and these frauds are evidently still considered as a source of very productive emolument annexed to the watering system. Notwithstanding the preference given to Hertfordshire malt, they urge no complaint on that head, but assert they are greatly injured by what is called ship malt on the coast, which is sold at an inferior price, which they allow can only arise from fraud and watering: admitting also that their own frauds have been suppressed, while the others are going on. (*Retrospect, No.* 13.)

*To* Malt. *v. n.* 1. To make malt. 2. To be made malt (*Mortimer*).

MA'LTDRINK. *s.* All *maltdrinks* may be boiled to a slimy syrup (*Floyer*).

MA'LTDUST. *s.* It is an enricher of barren land (*Mortimer*).

MA'LTFLOOR. *s.* A floor to dry malt (*Mortimer*).

MA'LTHORSE. *s.* A dull dolt (*Shaksp.*).

MA'LTMAN. Ma'ltster. *s.* (from *malt.*) One who makes malt (*Swift*).

MALTA, an island in the Mediterranean, situated about fifty miles from the coast of Sicily. Anciently, it was called Iberia, afterwards Ogygia, and by the Greeks Melite, from which, at last, the Saracens formed the appellation of Malta. Its length is computed to be twenty miles, its greatest breadth twelve, and its circumference sixty miles. It is entirely rocky, and produces no more corn than barely suffices to maintain the inhabitants for six months. Many ship loads of earth have, indeed, been brought here from Sicily, and the rocky bottom covered therewith, in order to render it in some places more fruitful, but the soil has in a short time crumbled into dust, there being but little rain to preserve it in a proper adhesion. The wine produced in this island is not sufficient for its consumption, and it, also, is deficient in wood. On the other hand, it has fruits and cotton, a plenty of honey, good pastures, considerable fisheries, sea-salt, and a profitable coral fishery. Its annual revenues are computed at 76,000 scudi. The number of its inhabitants amounts in all to about 60,000. The common language of the country is a corrupt Arabic, but in towns Italian is spoken. The most ancient inhabitants of this island, of whom we have any account, were the Phœacians, who were driven out by the Phœnicians, and they in their turn by the Greeks. Afterwards it seems to have been under the dominion of the Carthaginians, from whom the Romans took it. Upon the declension of the Roman empire, it was first subdued by the Goths, then by the Saracens, but wrested from them by the Normans, in the year 1090, after which time it had the same masters as Sicily, till Charles V. gave it to the knights of St. John of Jerusalem, who had been successively driven from Palestine and Rhodes: in consequence of which they have been called the knights of Malta. Valetta is the capital. See Valetta.

Malta, Melita, or Citta Vecchia, an ancient and strongly fortified city of the island of Malta. It is the residence of the bishop, and the cathedral is a very fine structure. Near this city are the catacombs, which are said to extend fifteen miles under ground; and a small church, dedicated to St. Paul, adjoining to which is a statue of the saint, with a viper in his hand, said to be placed on the spot where he shook the viper off, without having been hurt; and close to it is the grotto in which he was imprisoned. Malta is seated on a hill in the centre of the island, and was formerly twice as large as at present; for the new city, Valetta, being more conveniently situate, has drawn away the greater number of its inhabitants. This island is now in the possession of the British crown.

Malta (Knights of), otherwise called Hospitalers of St. John of Jerusalem, a religious military order, whose residence is in the island of Malta, situated in the Mediterranean sea, upon the coast of Africa. The knights of Malta, so famous for defending Christendom, had their rise as follows.

Some time before the journey of Godfrey of Bouillon into the Holy Land, some Neapolitan merchants, who traded in the Levant, obtained leave of the caliph of Egypt to build an house for those of their nation who came thither on pilgrimage, upon paying an annual tribute.

Afterwards they built two churches, and received the pilgrims with great zeal and charity This example being followed by others, they founded a church in honour of St. John, and an hospital for the sick; whence they took the name of Hospitalers. A little after Godfrey of Bouillon had taken Jerusalem, in 1099, they began to be distinguished by black habits and a cross with eight points; and, besides the ordinary vows, they made another, which was to defend the pilgrims against the insults of the infidels. This foundation was completed in 1104, in the reign of Baldwin; and so their order became military, into which many persons of quality entered, and changed the name of hospitalers into that of knights.

When Jerusalem was taken, and the Christians lost their power in the East, the knights retired to Acre or Ptolemais, which they defended valiantly in 1290. Then they followed the king of Cyprus, who gave them Limisson in his dominions, where they stayed till 1310. That same year they took Rhodes, under the grand-master Folques de Villaret, a Frenchman; and next year defended it against an army of Saracens: since which the grand-masters have used these four letters, F. E. R. T. i. e. "Fortitudo ejus Rhodum tenuit;" and the order was from thence called the knights of Rhodes.

In 1522, Soliman having taken Rhodes, the knights retired into Candia, and thence into Sicily. In 1530 Charles V. gave them the island of Malta, to cover his kingdom of Sicily from the Turks. In 1566, Soliman besieged Malta; but it was gallantly defended by the grand-master John de Valette Parisot, and the Turks obliged to quit the island with great loss.

The knights consisted of eight different languages or nations, of which the English were formerly the sixth; but at present they are but seven, the English having withdrawn themselves. In each language there is several grand priories, and capital bailiages. To each language belongs a hall, where the knights eat, and hold their ordinary assemblies. Each grand-prior has a number of commanderies.

The commanderies are either magisterial, or else by right, or, finally, by favour. The magisterial are those annexed to the grand-mastership, whereof there is one in each grand-priory: commanderies by right are those which come by right of seniority; their seniority is computed from the time of their admission; but they must first have lived five years at Malta, and have made four caravannes, or cruising voyages, on the Turks and Corsairs; commanders by favour are those which the grand-master, or the grand-prior, have a right of conferring; one of these they confer every five years on whom they please. The noble knights are called knights by right; and none but these can be bailiffs, grand-priors, or grand-masters. Knights by favour are those, who, not being noble of themselves, are raised on account of some great exploit, or some noble service, into the rank of nobles.

The servitors, or serving-brothers, are of two kinds; 1. The servitors of war, whose functions are the same with those of the knights. 2. The servitors of religion, whose whole business is to sing the praises of God in the conventual church, and to officiate each in his turn as chaplain on board the vessels and gallies of the order.

The brothers of obedience are priests, who, without being obliged to go to Malta, take the habit of the order, make the vows, and attach themselves to the service of some of the churches of the order, under the command of a grand-prior or commander, to whom they pay obedience.

The knights of majority are those who, according to the statutes, are admitted at sixteen years of age. The knights of minority are those who are admitted from the time of their birth; which, however, cannot be done, without a dispensation from the pope.

The chaplains can only be admitted regularly from ten to fifteen years of age: after fifteen, they must have a brief from the pope; till fifteen, the grand-master's letter is sufficient. These are called diacos, and must give proof of their being born of creditable families.

For the proofs of nobility to be made before the admission of knights, in the language of Germany, they go back six generations; in the rest it is sufficient to go back to the great grandfather on the father's or mother's side.

All the knights, after their profession, are obliged to wear a white cross, or star with eight points, over the cloak or coat, on the left-side; which is the proper habit of the order, the golden cross being only an ornament.

There are also female hospitalers of the order of St. John of Jerusalem, sometimes also called chevalieresses, or she-knights, of equal antiquity with the knights themselves; whose business was to take care of the women-pilgrims, in an hospital apart from that of the men. A few years ago the emperor of Russia took the order of Malta under his protection.

MALTHA, Μαλθη, in antiquity, denotes any cement, or glutinous body, which has the faculty of binding things together.

MALTHA, in mineralogy, a species of BITUMEN; which see.

MALTHA'CTICS. (from μαλασσω, to soften.) Emollient medicines.

MALTHA'XIS. (from μαλασσω, to soften.) Emollition; the art of making medicines or other substances soft.

MALTHOCODE, a term by which the Greek writers express the emollient topical remedies prepared with oil. Hippocrates expressly forbids the use of these in old ulcers.

MALTON, a town of the north-riding of Yorkshire, seated on the river Derwent, over which there is a good stone bridge. It is composed of two towns, the New and the Old; and is well inhabited, accommodated with good inns, and sends two members to parliament. Lon. 0. 40 W. Lat. 54. 9 N.

MALVA. Mallow. In botany, a genus of the class monadelphia, order polyandria. Calyx double, the outermost two or three-leaved; capsules numerous, one-seeded, disposed in a flat ring. Fifty-seven species; scattered over the globe; some with undivided leaves; the greater number with angular leaves. Four

of the species common to the wastes, hedges, and gravelly fields of our own country. We can only advert to a few.

1 M. sylvestris. Common mallow. Stem erect, herbaceous; leaves with seven sharpish lobes; peduncles and peticles hairy. Found in our hedges; and has a strong resemblance to the althæa, both in external character and medicinal virtues. It is principally used in fomentations, cataplasms, and emollient enemas.

2. M. alcea. Vervain mallow. Stem erect; lower leaves angular, upper ones five-parted and roughish; leaves of the outer calyx oblong, obtuse. A native of Germany; and employed medicinally in that country like M. sylvestris.

3. M. crispa. Stem erect; leaves angular, curled: flowers axillary, clustered. A native of Germany. The fibres of the bark of this, and several species, macerated like those of hemp, afford a whiter and tougher woof than is obtained from hemp, and of course produces a more valuable cloth.

MALVERN (Great and Little), two small towns of Worcestershire, in which were formerly two abbeys. The gateway of the abbey of Great Malvern remains. Little Malvern stands in a cavity of the hills, which are lofty mountains, rising like stairs, one higher than another, for about seven miles; and present a very grand appearance from different parts of Worcestershire, Herefordshire, and Gloucestershire. The highest of these hills is 1313 feet above the surface of the Severn.

MALVERN WATER. This mineral water is classed amongst the simple cold waters. Its contents, as well as that of Holywell in the county of Flint, are some carbonic acid, a very small portion of earth, either lime or magnesia, united with the carbonic and marine acids; perhaps a little neutral alkaline salt, and a very large proportion of water. Malvern water is principally employed externally in scrophulous inflammations of the eyes, and all cutaneous eruptions; internally it is prescribed in painful affections of the kidneys and bladder, attended with bloody, purulent, or fetid urine, irritating sores of the surface, and fistulas of long standing.

MALVA'CEOUS. *a.* (*malva*, Latin.) Relating to mallows.

MALVERSA'TION. *s.* (French.) Bad shifts; mean artifices.

MALVEZZI (Virgilio marquis de), an Italian gentleman, born at Bologna, acquired great reputation by his learning and writings. He was well versed in potite literature, music, law, physic, and the mathematics. He served also in a distinguished post in the army of Philip IV. king of Spain, and was employed by him in some important negotiations. He died at Bologna in the year 1654, leaving several works in Spanish and Italian. Among the latter are his Discourses on the First Book of Tacitus: this work has been translated into English.

MALUM MORTUUM. A disease that appears in the shape of a pustule, which soon forms a dry, brown, hard, and broad crust. It is seldom attended with pain, and remains fixed for a long time before it can be detached. It is mostly observed on the tibia and os coccygis, and sometimes on the face.

MALUNG, a town of Sweden, in the province of Dalecarlia, 55 miles W. of Fahlun. Lon. 15. 20 E. Lat. 60. 30 N.

MALWA, a province of Hindustan Proper, bounded on the W. by Guzerat, on the N. by Agimere, on the E. by Allahabad and Orissa, and on the S. by Candish. It is one of the most extensive, elevated, and diversified tracts in Hindustan; and is divided among the chiefs of the Poonah Mahrattas. Ougein and Indore are the principal towns.

MALZIEU, a town of France, in the department of Lozere, 20 miles N.N.W. of Mende.

MAM. MAMMA'. *s.* (*mamma*, Latin.) The fond word for mother (*Prior*).

MAMALUKES, MAMMELUKES, or MAMMALUCKS, the name of a dynasty, which reigned a considerable time in Egypt.

The word comes from מלך, *regere, imperare*, the Arabic participle whereof is ממלך, *Mamluc*, which signifies subject, or one under the dominion of another. Scaliger holds, that the word is Arabic, and that it properly signifies something bought with money; but others will have it signify any thing acquired, either as prize or purchase.

The Mamalukes were originally Turkish and Circassian slaves, bought of the Tartars by Melicsaleh, to the number of a thousand; whom he bred up to arms, and raised some to the principal offices of the empire. They killed sultan Moadam in 1250, being affronted at his concluding a treaty with his prisoner St. Louis, without their privity. This Moadam was the last sultan of the Ajoubites; to whom succeeded the Mamalukes, the first of whom was sultan Azeddin, or Mouz Ibec, the Tourcoman.

Others say that the Mamalukes were ordinarily chosen from among the Christian slaves; and that they were the same thing, in great measure, with the Janizaries among the Turks. They never married. The first are said to have been brought from Circassia; and some add that they first began to be talked of about the year 869.

MAM'ILLÆ. (*mamilla*, dim. *mamma*, the breast.) In anatomy, the breasts of males. It is likewise applied sometimes to the female nipple.

MAMMA. (*mamma.*) See BREAST.

MAMMA'LIA. In zoology, the first class as arranged by Linnéus, comprising the seven orders primates, bruta, feræ, glires, pecora, belluæ, cete. It includes all those animals, as indeed its name imports, that suckle their young by the possession of a mammalian or mammary organ. In English we have no direct synonym for this term; quadruped or four-footed, which has usually been employed for this purpose, is truly absurd, since one of the orders have no feet whatever, and another offers one or two genera, that cannot with propriety be said to have more than two feet. We have

hence thought ourselves justified in vernaculizing the Latin term, and translating mammalia mammals, or breasted-animals.

MAMMA'RIA, in zoology, a genus of the class vermes, order mollusca. Body smooth, without cirri or rays; aperture single. Three species; all inhabitants of the Northern Ocean: of which the most worthy of notice is M. globulus; body globular, cinereous, not fixed, gelatinous with a very thin skin, about a line and a half in diameter: found on the Greenland shores, amongst the roots of fuci, and constitutes the chief food of the terebella cirrata.

MAMMARY ARTERIES. Arteriæ mammillares. The internal mammary artery is a branch of the subclavian, and gives off the mediastinal, thymal, and pericardiac arteries. The external mammary is a branch of the axillary artery.

MAMMARY VEINS. Venæ mammillares. These vessels accompany the arteries, and evacuate their blood into the subclavian vein.

MAMME'A. Mammee. In botany, a genus of the class polyandria, order monogynia. Calyx two-leaved; petals four; berry very large, three or four-seeded. Two species; one a native of Jamaica and South America; the other of Montserrat. The former a large tree with obtuse, striate, opposite oblong leaves; short peduncles, four-petalled corols, succeeded by a large, round, esculent fruit, of delicious flavour. The tree may be propagated by seeds, and reared in our own stoves.

MAMMEE. A delicious fruit, the produce of the Mammea Americana of Linnéus. They have a very grateful flavour when ripe, and are much cultivated in Jamaica, where they are generally sold in the markets for one of the best fruits of the island.

MAMMEE-SAPOTA, in botany. See ACHRUS.

MA'MMET. *s.* (from *mam* or *mamma.*) A puppet; a figure dressed up (*Shakspeare*).

MA'MMIFORM. *a.* (*mamma* and *forma*, Latin.) Having the shape of paps or dugs.

MAMMI'LLARY. *a.* (*mammillaris*, Lat.) Belonging to the paps or dugs.

MA'MMOCK. *s.* A shapeless piece (*James*).

*To* MA'MMOCK. *v. a.* (from the noun.) To tear; to break; to pull to pieces (*Shakspeare*).

MAMMON, the god of riches, according to some authors; though others deny that the word stands for such a deity, and understand by it only riches themselves. Our Saviour says, We *cannot serve God and mammon:* that is, be religious and worldly-minded at the same time. Our poet Milton, by poetic licence, makes Mammon to be one of the fallen angels, and gives us his character in the following lines.

> Mammon, the least erected spirit that fell
> From heav'n: for ev'n in heav'n his looks
> and thoughts
> Were always downward bent; admiring
> more
> The riches of heav'n's pavement, trodden
> gold,
> Than aught divine or holy else enjoy'd
> In beatific vision: by him first
> Man also, and by his suggestion taught,
> Ransack'd the centre, and with impious
> hands
> Rifled the bowels of their mother earth
> For treasures better hid. Soon had his crew
> Open'd into the hill a spacious wound,
> And digg'd out ribs of gold. Let none
> admire
> That riches grow in hell; that soil may best
> Deserve the precious bane.

MAMMOTH, in zoology. See MEGATHERIUM.

MAMRE, an Amorite, brother of Aner and Eschol, and friend of Abraham (Gen. xiv. 13.). It was with these three persons, together with his own and their domestics, that Abraham pursued and overcame the kings after their conquest of Sodom and Gomorrah. This Mamre, who dwelt near Hebron, communicated his name to great part of the country round about. Hence we read (ch. xiii. 18. xxiii. 17, &c.), that Abraham dwelt in Mamre and in the plain of Mamre. But it is observed, that what we translate the *plain*, should be rendered the *oak*, of Mamre, because the word *elon* signifies an *oak* or *tree of a long duration.*

MAMURIUS VETURIUS, a worker in brass in Numa's reign. He was ordered by the monarch to make a number of ancylia or shields, like that one which had fallen from heaven. (See ANCILIA.) He was very successful in his undertaking, and he asked for no other reward, but that his name might be frequently mentioned in the hymns which were sung by the Salii in the feast of the Ancylia. This request was granted.

MAN. *s.* (man, mon, Saxon.) 1. Human being (*Creech*). 2. Not a woman (*Shaksp.*). 3. Not a boy (*Dryden*). 4. A servant; an attendant (*Cowley*). 5. A word of familiar address, bordering on contempt (*Shakspeare*). 6. It is used in a loose signification like the French *on*, one, any one: as, *though a* man *be wise he may err* (*Addison*). 7. One of uncommon qualifications (*Addison*). 8. A human being qualified in any particular manner (*Samuel*). 9. Individual (*Watts*). 10. Not a beast (*Creech*). 11. Wealthy or independent person (*Tillotson*). 12. A moveable piece at chess or draughts. 13. MAN *of war.* A ship of war.

MAN, in zoology. See the articles HOMO, PHYSIOLOGY, LIFE, and ZOOLOGY.

From the superiority of his organization when compared with all other vital organized beings, man may justly place himself at the head of the visible creation. His form is erect, his power is pre-eminent; his passions are within the range of his own discipline; his happiness is not confined to things of sense; his knowledge is progressive, and his duration is eternal.

In contemplating him anatomically and chemically we find the animal machine governed by three principal regulators: respiration, which by producing in the lungs, and perhaps in other parts of the system, a slow combustion of the hydrogen and carbon contained in the blood, excites a disen-

gagement of caloric absolutely necessary to the support and existence of his animal heat: perspiration, which by occasioning a loss of the perspirable humour, facilitates the disengagement of a certain quantity of caloric necessary to the solution of this humour in the surrounding air; and consequently prevents, by the continual coldness this disagreement produces, the individual from receiving a degree of heat or perspiration superior to what is fixed by nature: and digestion, which by furnishing the blood with water, hydrogen and carbon, restores habitually to the animal machine what it loses by respiration and perspiration, and afterwards rejects externally substances that are hurtful or superfluous to it.

If the causes which affect man are various his resources are equally multiplied: his temperamenti s either adapted for motion or repose, for abstinence or excess of nourishment. Similar circumstances permit him to pass from an active to a tranquil life, according to his necessities or his will. If he be in a state of inaction and repose, the circulation is slow as well as the respiration, he consumes less air, exhales less carbon and hydrogen from the lungs, and consequently has less need of nourishment. If he be obliged to work hard, the respiration is accelerated; he consumes more air, loses more hydrogen and carbon, and consequently has need of oftener repairing what is lost, by a greater quantity of nutrition. In running, dancing, and all violent exercises, whatever acceleration the respiration and circulation undergo, or whatever increase there is in the consumption of air, of hydrogen and carbon, the equilibrium of the animal economy is not disturbed, whilst the aliments more or less digested, always more or less in reserve in the intestinal canal, supply their loss: but if the expence made by the lungs be greater than the receipt made by nutrition, the blood is deprived by degrees of its hydrogen and carbon, and disease succeeds. In this case the animal is advised of the danger by lassitude or loss of vigour, and finds the necessity of re-establishing the equilibrium by nourishment and repose. The contrary takes place for want of motion and exercise, or the use of certain aliments, or any imperfection or vice in the organs of nutrition or respiration. In these cases the digestion introducing into the blood more matter than the respiration can consume, an excess of carbon or of hydrogen, or of both, takes place in the mass of blood. Nature at such time strives against such an alteration in the humours; and if she cannot recover the equilibrium by a more frequent respiration, disease is the consequence.

Whilst we merely consider the consumption of air in respiration, the lot of the rich and the poor is equal, for the air belongs to all and costs nothing: the labourer, from his greater energy, enjoys more completely this gift of nature, for he drinks larger draughts of it, and relishes it with a higher zest: but since experience has proved respiration to be a real combustion, that consumes at each instant a portion of our substance, that this consumption is increased in proportion as the circulation and respiration are accelerated, and of course in proportion to the more laborious and active life of the individual; a multitude of moral reflections force themselves upon the mind with queries that it is not perhaps easy to answer at first sight. Why should the poor man, who lives by the sweat of his brow, and is obliged to expend the force which nature allots him, consumes more of his individual substance than his richer and idler neighbour, whilst at the same time this last has less need of repairing? Why should the rich man enjoy an abundance which is not physically necessary for him, and which would seem to be destined for the daily labourer? Let us not however calumniate nature: these are evils for which human institutions alone are answerable, and with which she has no concern: they are also evils which are in themselves an operation of very extensive good; and prove the wisdom of the institutions to which they owe their birth.

This result of forces continually varying and continually poising each other, and which are every moment in the animal economy, is truly to be admired. Man in this respect has been more favoured by nature than any other animal: he lives equally in all temperatures and in all climates: if he finds himself in a cold climate, the contact of the air with the lungs, from its greater density, becomes more considerable: more air is decomposed, more caloric disengaged, which repairs the loss produced by the external cold; at the same time that the perspiration diminishes, evaporation grows less, and hence the cold itself becomes more temperate. If he pass into a hot climate the contrary effect takes place. The air being less dense, its contact with the blood becomes less considerable: less air is decomposed, less caloric disengaged, a more abundant perspiration established, and a greater quantity of heat taken away: and in this manner is it that an almost uniform degree of heat is observed in animals that breathe, which is about 32° of Reaumur, or 98° of Fahrenheit.

Man, in animal chemistry, is compounded of solids, fluids, a vital principle, and, what distinguishes him from every other animal, a soul.

The solids are divided into hard and soft, which analysis demonstrates to be formed of earthy particles, connected together by an intermediate gluten. The hard parts are the bones and cartilages. The soft parts, muscles, nerves, the viscera, and every other part except the fluids. The fluids are very various. See Fluids. Anatomy demonstrates the structure of the various parts of which the human body consists: these the reader will find under their respective heads, as muscles, bones, cartilages, &c. and of late great progress has been made towards ascertaining, by chemical criteria, its principles and elements. The constituent principles of man are, 1. The water, which constitutes the greatest part of the humours, and is the vehicle of the other principles. 2. The animal gass, which consists of carbonated hydrogenæ, and is found not only in the blood, but in all the other fluids. 3. The inflammable gass, emitted from the large intestines, *in flatu*. 4. The animal gluten, which consists of carbone, and azot, and forms the fibres of the solid parts; the caseous portion of the milk; and the cruor of the blood. 5. The albumen, present in the serum of the blood. 6. The jelly, found in the serum of the blood; lymph of the lymphatic vessels, and other fluids; and the interstices of all the fibres. 7. The cruor, which is the animal gluten impregnated with oxydated iron. 8. The mucus, which lubricates the primæ viæ; the aerial surfaces of the lungs; the parts of generation, and urinary passages. 9. The animal oil, which fills the cells of the adipose membrane. 10. The resin, found in the bile. 11. The sebacic acid, which is present in animal oil. 12. The phosphoric acid, which enters into the composition of the animal earth of the bones, and the phosphorated salts of

the urine. 13. The lactic acid, in the sugar of the serum of the milk. 14. The sugar, latent in the serum of the milk. 15. The animal earth, which is a phosphorated calx, and not only forms the greatest part of the bones, but also is found in the fibres of the soft parts, and in all the fluids. 16. Phosphorated volatile alkali, and 17. Phosphorated soda, both of which are detected in the urine. 18. Culinary salt, obtained from the urine, gastric juice, semen, and other humours.

The elementary principles of our body hitherto known are, 1. Azot, an element which combined with hydrogene constitutes volatile alkali; with the matter of heat, azotic air; with carbon, the gluten of animal fibres. Azot is the primary element of the animal body, for it may be extracted from almost every part of the animal, by means of the nitrous acid, this having a greater affinity with the elements than the azot itself. The mucus, jelly, membranes, tendons, ligaments, and cartilages, afford it in a less degree by means of the nitrous acid. The lymph, serum of the blood, the water of hydropic patients, the liquor amnii, and cheese, give out more. The greatest quantity of azot is obtained from the coagulable lymph of the blood, and from muscle. The flesh of young animals contain less than that of old; and it is in greater quantity in sarcophagous, than in the flesh of phytophagous animals and fish. It is not probable that the azot is produced by the decomposition of the nitre; for after having performed the separation, it is capable of saturating the same quantity of salt of tartar as before. 2. The matter of heat, which enters into the composition of both solids and fluids, and which, in a separate form, constitutes the animal heat. 3. The matter of light, which in its free state produces vision, and, when compounded, enters as an element into the composition of oil and all other inflammable parts. The eyes of animals, which shine in the night-time, owe this property to the matter of light. 4. The electric matter, which enters into all bodies, and affords the phenomena of animal electricity. 5. Oxygen, which, in combination with the matter of heat, constitutes vital air; with hydrogen, forms water; with acescent bases, the acid salts of our fluids. 6. Hydrogen, which, combined with oxygen, forms water; with azot, volatile alkali; with the matter of heat, inflammable air, which is emitted from the large intestines; and with carbon, animal gass: and lastly, combined with carbon and the sebacic acid, constitutes the oil of the adipose membrane. 7. Carbon, which, in combination with hydrogene and the sebacic acid, constitutes the oil of the adipose membrane; with hydrogen alone, animal gass; with azot, animal gluten. 8. Sulphur, which, combined with inflammable air, constitutes the hepatic air, that exhales from muscular fibres, hair, incubated eggs, animal gluten, and, according to Lavoisier, human excrement. 9. Phosphorus, which, with oxygen, forms the phosphoric acid; and, with inflammable air, phosphoric air. The lucid sweat of some men, the phosphorescence or light given out by the putrifying bodies of some animals, and the phosphorus obtained from cheese and human bones, sufficiently shew that phophorus constitutes an element of our body. 10. Soda, or the fixed mineral alkali. 11. Potash, or the fixed vegetable alkali. Each of these is found in several of the fluids of the human body. 12. An earthy element. Of the earths, no kind is so frequently detected as the calcareous, which is found in the bones and other parts. 13. A metallic element. Of so great a number of metals, iron and manganese alone are found in an organized body, whether animal or vegetable. Iron is in greater quantity in the flesh than in the bones; but in the greatest proportion in the cruor or red part of the blood. 14. An odorous principle, perceptible in all the animal fluids; but of a peculiar kind in the human urine and excrements. 15. The nervous fluid, contained in the nerves, and which appears to be an element *sui generis*, distinct from all known fluids, and not to be collected by art. 16. The vital principle. In all solid and fluid parts of a living body there exists an element, with properties peculiar to itself, which constitutes life; hence it is justly called vital. This principle induces a mode of union in the other elements, widely differing from that which arises from the common laws of chemical affinity. By the aid of this principle nature produces the animal fluids, as blood, bile, semen, and the rest, which can never be produced by the art of chemistry. But if, in consequence of death, the laws of vital attraction or affinity cease to operate, then the elements, recovering their former properties, become again obedient to the common laws of chemical affinity, and enter into new combinations, from which, new principles, or the production of putrefaction, are produced. Thus the hydrogen, combining itself with the azot, forms volatile alkali; and the carbonated hydrogen, with the azot, putrid air, into which the whole body is converted. It also appears from hence, why organized bodies alone, namely animal and vegetable, are subject to putridity; to which inorganic or mineral substances are in no degree liable, the latter not being compounded according to the laws of vital affinity, but only according to those of chemical affinity. For the fatiscense or resolution of the pyrites or ferrum sulphuratum in the atmospheric air, is not putrefaction, but only the oxygen, furnished by the air, combining with the sulphur, and forming sulphuric acid. Fire, as well as putridity, separates the constituent principles of animal bodies into their elements; but these, by a peculiar law, under the action of fire again combine in a peculiar manner, and form peculiar constituent principles, called the products of fire. Thus the hydrogen, combining with azot, is changed into volatile alkali; but with a large proportion of carbon, it forms empyreumatic oil. From what has hitherto been said, it will also appear, that the true constituent principles of an animal body cannot be detected either by putrefaction or the action of fire; for by these means we only discover the elements of those principles. Upon this subject see the article Blood.

Man (Varieties of), See Homo.

We resume the subject here, because as infidel ignorance is perpetually pretending, that the diminutive Icelanders, the ugly Esquimaux, the woolly-headed Negro, and the copper-coloured American, could not have descended from one original pair, either of European complexion or of Hindu symmetry—it may not be improper, in this place, to shew the weakness of this popular objection to the Mosaic history of the origin of man. This has been done in so satisfactory a manner by professor Blumenbach, that we have nothing to do but to lay his observations before our readers, convinced, as we are, that they are intelligible to every capacity, and that they will

carry conviction to all who are not the slaves of prejudice.

"Some late writers on natural history (says the professor) seem doubtful whether the numerous distinct races of men ought to be considered as mere varieties, which have arisen from degeneration, or as so many species altogether different. The cause of this seems chiefly to be, that they took too narrow a view in their researches; selected, perhaps, two races the most different from each other possible, and, overlooking the intermediate races that formed the connecting links between them, compared these two together; or, they fixed their attention too much on man, without examining other species of animals, and comparing their varieties and degeneration with those of the human species. The first fault is, when one, for example, places together a Senegal negro and an European Adonis, and at the same time forgets that there is not one of the bodily differences of these two beings, whether hair, colour, features, &c. which does not gradually run into the same thing of the other, by such a variety of shades, that no physiologist or naturalist is able to establish a certain boundary between these gradations, and consequently between the extremes themselves.

"The second fault is, when people reason as if man were the only organised being in nature, and consider the varieties in his species to be strange and problematical, without reflecting that all these varieties are not more striking or more uncommon than those with which so many thousands of other species of organised beings degenerate, as it were, before our eyes."

As what we have said under the article HOMO may be sufficient to warn mankind against the first error, and at the same time to refute it, we hasten to refute the second by our author's comparison between the human race and that of swine.

"More reasons (says he) than one have induced me to make choice of swine for this comparison; but, in particular, because they have a great similarity, in many respects, to man: not, however, in the form of their entrails, as people formerly believed, and therefore studied the anatomy of the human body purposely in swine; so that, even in the last century, a celebrated dispute, which arose between the physicians of Heidelberg and those of Durlach, respecting the position of the heart in man, was determined, in consequence of orders from government, by inspecting a sow, to the great triumph of the party which really was in the wrong. Nor is it because in the time of Galen, according to repeated assertions, human flesh was said to have a taste perfectly similar to that of swine; nor because the fat, and the tanned hides of both, are very like to each other; but because both, in regard to the economy of their bodily structure, taken on the whole, shew unexpectedly, on the first view, as well as on closer examination, a very striking similitude.

"Both, for example, are domestic animals; both *omnivora*; both are dispersed throughout all the four quarters of the world; and both consequently are exposed, in numerous ways, to the principal causes of degeneration arising from climate, mode of life, nourishment, &c.; both, for the same reason, are subject to many diseases, and, what is particular worthy of remark, to diseases rarely found among other animals than men and swine, such as the stone in the bladder; or to diseases exclusively peculiar to these two, such as the worms found in measled swine.

"Another reason (continues he) why I have made choice of swine for the present comparison is, because the degeneration and descent from the original race are far more certain in these animals, and can be better traced, than in the varieties of other domestic animals. For no naturalist, I believe, has carried his scepticism so far as to doubt the descent of the domestic swine from the wild boar; which is so much the more evident, as it is well known that wild pigs, when caught, may be easily rendered as tame and familiar as domestic swine: and the contrary also is the case; for if the latter by any accident get into the woods, they as readily become wild again; so that there are instances of such animals being shot for wild swine; and it has not been till they were opened, and found castrated, that people were led to a discovery of their origin, and how, and at what time, they ran away. It is well ascertained, that, before the discovery of America by the Spaniards, swine were unknown in that quarter of the world, and that they were afterwards carried thither from Europe. All the varieties, therefore, through which this animal has since degenerated, belong, with the original European race, to one and the same species; and since no bodily difference is found in the human race, as will presently appear, either in regard to stature, colour, the form of the cranium, &c. which is not observed in the same proportion among the swine race, while no one, on that account, ever doubts that all these different kinds are merely varieties that have arisen from degeneration through the influence of climate, &c. this comparison, it is to be hoped, will silence those sceptics who have thought proper, on account of these varieties in the human race, to admit more than one species.

"With regard to stature, the Patagonians, as is well known, have afforded the greatest employment to anthropologists. The romantic tales, however, of the old travellers, who give to these inhabitants of the southern extremity of America a stature of ten feet and more, are scarcely worth notice; and even the more modest relations of later English navigators, who make their height from six to seven feet, have been doubted by other travellers, who, on the same coast, sought for such children of Enoch in vain. But we shall admit every thing said of the extraordinary size of these Patagonians by Byron, Wallis, and Carteret; the first of whom assigns to their chief, and several of his attendants, a height of not less than seven feet, as far as could be determined by the eye; the second, who asserts that he actually measured them, gives to the greater part of them from 5 feet 10 inches to 6 feet; to some 6 feet 5 inches, and 6 feet 6; but to the tallest, 6 feet 7 inches: and this account is confirmed by the last-mentioned of the above circumnavigators. Now, allowing this to be the case, it is not near such an excess of stature as that observed in many parts of America among the swine, originally carried thither from Europe; and of these I shall mention in particular those of Cuba, which are more than double the size of the original stock in Europe.

"The natives of Guinea, Madagascar, New Holland, New Guinea, &c. are black; many American tribes are reddish brown; and the Europeans are white. An equal difference is observed among swine in different countries. In Piedmont, for example, they are black. When I passed

(says our author) through that country, durin the great fair for swine at Salenge, I did not see a single one of any other colour. In Bavaria, they are reddish brown; in Normandy, they are all white.

"Human hair is, indeed, somewhat different from swine's bristles; yet, in the present point of view, they may be compared with each other. Fair hair is soft, and of a silky texture; black hair is coarser, and among several tribes, such as the Abyssinians, Negros, and the inhabitants of New Holland, it is woolly, and most so among the Hottentots. In the like manner, among the white swine in Normandy, as I was assured by an incomparable observer, Sulzer of Ronneburg, the hair on the whole body is longer and softer than among other swine; and even the bristles on the back are very little different, but lie flat, and are only longer than the hair on the other parts of the body. They cannot, therefore, be employed by the brush-makers. The difference between the hair of the wild boar and the domestic swine, particularly in regard to the softer part between the strong bristles, is, as is well known, still greater.

"The whole difference between the cranium of a Negro and that of a European is not in the least degree greater than that equally striking difference which exists between the cranium of the wild boar and that of the domestic swine. Those who have not observed this in the animals themselves need only to cast their eye on the figure which Daubenton has given of both.

"I shall pass over (says our author) less national varieties which may be found among swine as well as among men, and only mention that I have been assured by Mr. Sulzer, that the peculiarity of having the bone of the leg remarkably long, as is the case among the Hindus, has been remarked with regard to the swine in Normandy. 'They stand very long on their hind legs (says he, in one of his letters); their back, therefore, is highest at the rump, forming a kind of inclined plane; and the head proceeds in the same direction, so that the snout is not far from the ground.' I shall here add, that the swine, in some countries, have degenerated into races which in singularity far exceed every thing that has been found strange in bodily variety among the human race. Swine with solid hoofs were known to the ancients, and large herds of them are found in Hungary, Sweden, &c. In the like manner, the European swine, first carried by the Spaniards, in 1509, to the island of Cuba, at that time celebrated for its pearl fishery, degenerated into a monstrous race, with hoofs which were half a span in length." Phil. Mag. vol. iii.

From these facts, our author concludes, that it is absurd to allow the vast variety of swine to have descended from one original pair, and to contend that the varieties of men are so many distant species.

*To* Man. *v. a.* (from the noun.) 1. To furnish with men (*Daniel*). 2. To guard with men (*Shakspeare*). 3. To fortify; to strengthen (*Milton*). 4. To tame a hawk (*Shakspeare*). 5. To attend; to serve; to wait on as a servant (*Ben Jonson*). 6. To direct in hostility; to point (*Shakspeare*).

Man (Isle of), an island in the Irish sea, lying about seven leagues north from Anglesey, about the same distance west from Lancashire, nearly the like distance south-east from Galloway, and nine leagues east from Ireland. Its form is long and narrow, stretching from the north-east of Ayre-point to the Calf of Man, which lies south-west, at least 30 English miles. Its breadth in some places is more than nine miles, in most places eight, and in some not above five, and contains about 160 square miles.

The first author who mentions this island is Cæsar; for there can be as little doubt, that, by the Mona, of which he speaks in his Commentaries, placing it in the midst between Britain and Ireland, we are to understand Man; as that the Mona of Tacitus, which he acquaints us had a fordable strait between it and the continent, can be applied only to Anglesey. Pliny has set down both islands: Mona, by which he intends Anglesey, and Monabia, which is Man. In Ptolemy we find Monaæda, or Monaida, that is, the farther or more remote Mōn. Orosius styles it Menavia; tells us, that it was not extremely fertile; and that this, as well as Ireland, was then possessed by the Scots. Beda, who distinguishes clearly two Menavian islands, names this the northern Menavia, bestowing the epithet of southern upon Anglesey. In some copies of Nennius, this isle is denominated Eubonia; in others Menavia; but both are explained to mean Man. Alured of Beverley also speaks of it as one of the Menavian islands. The Britons, in their own language, called it Manaw, more properly Main au, *i. e.* "a little island," which seems to be latinized in the word Menavia. All which clearly proves, that this small isle was early inhabited, and as well known to the rest of the world as either Britain or Ireland.

The soil is very different; towards the south it is as good as can be desired. The mountains are cold, and consequently less fruitful. The valleys between them afford as good pasture, hay, and corn, as in most other places. Towards the north, indeed, there is a dry, barren, sandy earth, but capable of improvement. A large tract of land, called the Curragh, was formerly a bog, but since it has been drained, it is one of the richest parts of the island; and though the peat is six, eight, or ten feet deep, yet by good husbandry they have got a surface which will bear the plough. And the same place supplies the neighbourhood both with bread and fuel. In this place have been found very large trees of oak and fir, some two feet and a half in diameter, and forty feet long, supposed by the inhabitants to have lain here ever since the deluge. The oaks and fir do not lie promiscuously; but where is plenty of one sort, there are generally few or none of the other.—A high ridge of mountains runs almost the length of the island, which supplies the inhabitants quite round with water and fire. Abundance of little rivulets and springs of excellent water (by the sides of which the inhabitants have for the most part built their houses) run hence to the sea, and the sides of the moun-

tains are stored with heath, and an excellent peat for fuel. The highest of these mountains is called Snafield; its height, as taken by an exact barometer, being about 580 yards; the mercury subsiding two inches and one-tenth. From the top of this mountain they have a fair prospect of England, Scotland, Ireland, and Wales. The air is sharp and cold in winter; but in all such places as have a natural shelter, or an artificial one from trees, the air is as mild as in Lancashire; the frosts being short, and the snow not lying long on the ground, especially near the sea. The black cattle and horses are generally less than those of England; but as the land improves, so do these, and of late there have been some bred here as large as in other places. Of several noxious animals, such as badgers, foxes, otters, filmerts, moles, hedge-hogs, snakes, toads, &c. the inhabitants, in the time of bishop Wilson, from whom this account is taken, knew no more than their names; as also several birds, such as the woodpecker, the jay, the maup, &c. And it is not long since a person, more fanciful than prudent or kind to his country, brought in a breed of magpies, which have increased incredibly, so as to become a nuisance; and only a few years since somebody brought in frogs, which they say increase very fast. There are not many quarries of good stone: but one there is near Castle Town, which yields a tolerably good black marble, fit for tomb-stones, &c. There are also a good many quarries of a blue, thin, light slate, one of the best coverings for houses; of which great quantities are exported. Mines of coal there are none, though several attempts have been made to find them. But of lead, copper, and iron, there are several, and some of them have been wrought to good advantage, particularly the lead, of which ore many hundred tons have lately been smelted, and exported. This island has had many masters.—The Norwegians conquered this when they made themselves masters of the Western Isles, which they sent kings to govern, who generally chose the Isle of Man for their residence. This continued until 1266, when there was a very solemn agreement made between Magnus IV. of Norway, and Alexander III. of Scotland, by which this isle, among the rest, was surrendered to the Scots for 4000 marks, to be paid in four years, and 100 marks yearly; and, pursuant to this, Alexander drove out the king of Man, in the year 1270, and united it to Scotland. In 1312, there was a second agreement between Hacquin V. and Robert I. of Scotland; and in 1426, a third agreement, all of which are set down at large in Torfeus's History of the Orcades. But before this last agreement, the island was in the possession of John lord Stanley and of Man, who had it given him by Henry IV. in 1405. However, forasmuch as by the last agreement between the kings of Norway and Scotland, the latter claimed a right to this island, the lords of Man were obliged to keep a constant standing army and garrisons for the defence of it, till the reign of king James I. of England. And in this honourable house it continued to the year 1739, except for twelve years during the civil wars, when it was given by the parliament to the lord Fairfax; but it returned to its ancient lords at the restoration. After which it came to the duchess of Athol, the daughter of the earl, as a barony in fee. The lord sends a governor, lieutenant, or captain, who constantly resides at Castletown, where he has a handsome house, salary, and other conveniences befitting his station. He is to take care that all officers, civil and military, discharge their trusts and duty. He is chancellor, and to him there is an appeal in matters of right and wrong, and from him to the lord, and, finally (if occasion be) to the king of England, in council. By act of parliament, 1765, the island and lordship of Man, and all the islands and lordships, royalties and regalities, and franchises, liberties, and sea-ports to the same belonging, and all other the hereditaments and premises granted by the several letters patent to the family of Derby, &c. shall be unalienably vested in his majesty and successors, excepting and reserving to the duke of Athol and his heirs the patronage of the bishopric of the Isle of Man, or of the bishoprics of Sodor and Man, the temporals of the same when vacant, and all other patronages and ecclesiastical benefices within the island; also reserving the landed property, with all rights in or over the soil, as lords of the manor, with all courts baron, rents, services, and other incidents to such courts belonging, wastes, commons, and other lands, inland water, fishings, mills, mines, and minerals; and also reserving the honorary service of rendering to his majesty's heirs and successors, kings and queens of England, two falcons on the days of their respective coronations. By an abstract of the clear revenue of Man, from 1754 to 1763, the medium was 7293l. 0s. 6d. per annum; of which the land revenue for the last year was 1409l. 17s. 6d.; and the income of the lands in the hands of the lord of the isle 107l. The principal towns are Castle-Town, Peel, Douglas, and Ramsey. The commodities of this island are black cattle, and coarse woollen cloth, hides, skins, honey, and tallow. The Isle of Man was converted to the Christian faith by St. Patrick, about the year 440, at which time the bishopric of Man was erected. The bishops are barons of the island, and have a seat, though not a voice, in the English house of peers.

MAN OF WAR. See SHIP.

MAN OF WAR BIRD. See PELICANUS.

MANACHIA, or MAGNISA, the ancient Magnesia, a town of Natolia Proper, with a bishop's see, and a castle. It was formerly the capital of the Ottoman empire, and is seated at the foot of a mountain, on the river Sarabat, 22 miles N. of Smyrna. Lon. 27.25 E. Lat. 38.45 N.

MA'NACLES. *s.* (*manicæ*, from *manus*, Lat.) Chain for the hands; shackles. (*Ecclus*).

*To* MA'NACLE. *v. a.* (from the noun). To chain the hands; to shackle (*Shakspeare*).

*To* MA'NAGE. *v. a.* (*menager*, French.) 1. To conduct; to carry on (*Stillingfleet*). 2. To train a horse to graceful action (*Knolles*).

3. To govern; to make tractable (*Arbuthnot*). 4. To wield; to move or use easily (*Newton*). 5. To husband; to make the object of caution (*Dryden*). 6. To treat with caution or decency (*Addison*).

*To* MA'NAGE. *v. n.* To superintend affairs; to transact (*Dryden*).

MA'NAGE. *s.* (*menage*, French.) 1. Conduct; administration (*South.*) 2. Use; instrumentality (*Bacon*) 3. Government of a horse (*Peacham*). 4. Discipline; governance (*L'Estrange.*)

MANAGE, or MENAGE. An academy, riding-school, or other place for learning to ride the great horse; as also for breaking horses into their proper paces, motions and actions.—Every manage has a central spot for regulating the round or volts in which the practise or tactique of the manage consists, to which center a pillar is affixed. To this pillar horses are occasionally fastened in their first lessons. There are other pillars also placed in pairs at the sides of the manage, for the more perfect completion of the art. The manage may be divided into the greater and the less; or, as a modern writer has denominated them, "the grand and petit manage: the former constituting the management of the great horse, intended purely for the purposes of parade; the latter, confined solely to military tactics. The grand manage consists in teaching a horse, already perfectly broken in the common way, certain artificial motions, the chief of which are called the terra a terra, demi-volt, corvet, capriole, croupade, balotade, and the step and leap; which last is a motion compounded of three airs; the terra a terra, corvet, and the leap. When a horse is perfect in all these, he is styled a full dressed, or managed horse.

The petit manage is that drilling, or training, by which the army riding-masters fit the horse for military service in the ranks. The chief objects of it are, to set him upon his haunches, and make him rein well; to give him a cadenced pace; to teach him to rein back, or retreat; to move sideways, to stand fire, and to leap. After these a horse will soon become capable of all the necessary military evolutions. The common business of our town riding-schools is to teach grown gentlemen and ladies, and to set ill-broken horses upon their haunches. It is well known that the grand menage has been long out of fashion in this country; and farther, that it has for years past been upon the decline in every other. In truth it is a mere relict of that superstition in all things which is the characteristic of barbarous times. It is unnecessary to any good or useful purpose, because all such, whether of parade or business, may be fully answered by the common, rational, and uninjurious management; while there is always more or less cruelty practised in completing the full-dressed horse; such, for instance, as severe whippings, the meaning of which the horse cannot possibly comprehend, and which are therefore unnatural and illegitimate; the labour and irritation also are excessive; and, after all, the natural paces of the horse are spoiled, and he is rendered unfit for common business; the only compensation for which is, that he has learned sundry harlequin tricks; two of which are, to skip like a goat, and kick up behind like an ass."

MA'NAGEABLE. *a.* (from *manage.*) 1. Easy in the use (*Newton*). 2. Governable; tractable.

MA'NAGEABLENESS. *s.* (from *manageable*). 1. Accommodation to easy use (*Boyle*). 2. Tractableness; easiness to be governed.

MA'NAGEMENT. *s.* (*menagement*, Fr.) 1. Conduct; administration (*Swift*). 2. Prudence; cunning practice (*Dryden*). 3. Practice; transaction; dealing (*Addison*).

MA'NAGER. *s.* (from *manage.*) 1. One who has the conduct or direction of any thing (*South*). 2. A man of frugality; a good husband (*Dryden*).

MA'NAGERY. *s.* (*menagerie*, French.) 1. Conduct; direction; administration (*Clarendon*). 2. Husbandry; frugality (*Decay of Piety*). 3. Manner of using (*Decay of Piety*).

MANAR, an island of the East Indies, on the east coast of the island of Ceylon. The Portuguese got possession of it in 1560; the Dutch took it from them in 1658; and the English took it from the Dutch in 1795.—Lon. 80. 45 E. Lat. 9. 0 N.

MANASSEH (in Scripture hist.), the eldest son of Joseph, and grandson of the patriarch Jacob (Gen. xli. 50, 51.), was born in the year of the world 2290, before Jesus Christ 1714. The tribe descended from him came out of Egypt, in number 32,200 men, fit for battle, upwards of 20 years old, under the conduct of Gamaliel, son of Pedahzur (Numb. ii. 20, 21.). This tribe was divided at their entrance into the land of Promise. One half had its portion beyond the river Jordan, and the other half on this side the river.

MANASSEH, the 15th king of Judah, being the son and successor of Hezekiah. His acts are recorded in 2 Kings xx. xxi. and 2 Chr. xxxiii.

MANATI, in amphibiology. See TRICHECHUS.

MANA'TION. *s.* (*manatio*, Latin.) The act of issuing from something else.

MANATOULIN, a chain of islands on the N. side of Lake Huron, in N. America, extending about 100 miles in length, and eight in breadth. The name signifies a place of spirits; and they are held sacred by the Indians.

MANCA, was a square piece of gold coin, commonly valued at 30 pence; and mancusa was as much as a mark of silver, having its name from the manu cusa, being coined with the hand (*Leg. Canut*). But the manca and mancusa were not always of that value; for sometimes the former was valued at six shillings, and the latter, as used by the English Saxons, was equal in value to our half crown.

MANCANDO. (Ital.) In music, a word implying that the passage over which it is written is to be sung or played with a decreasing sound See DIMINUENDO.

MANCESTER, a village in Warwickshire, near Atherstone and the river Anker. It was a Roman station on the Watling-street, and here several coins have been dug up.

MANCHA, a territory of Spain, in New Castile, between the river Guadiana and Andalusia. It is a mountainous country; and it was here that Cervantes made his hero, Don Quixote, perform his chief exploits.

MANCHE, or CHANNEL, a department of France, including part of the late province of Normandy. It is almost surrounded by the English Channel, aud Coutances is the capital.

MANCHE is sometimes used for a sleeve.

MANCHESTER, a town of Lancashire in England, situated in W. lon. 2. 42. N. lat. 53. 29. Mr. Whitaker conjectures, that the station was first occupied by the Britons about 500 years B. C. but that it did not receive any thing like the form of a town till 450 years after, or 50 years B. C. when the Britons of Cheshire made an irruption into the territories of their southern neighbours, and of consequence alarmed the Sestuntii, or inhabitants of Lancashire, so much, that they began to build fortresses in order to defend their country. Its British name was *Mancenion*, that is, "a place of tents:" it was changed, however, into Mancunium by the Romans, who conquered it under Agricola, in the memorable year of the Christian æra 79. It appears also to have been called Manduesuedum, Manduessedum, Manucium, and Mancestre; from which last it seems most evident that the present name has been derived. It is distant from London 182 miles, and from Edinburgh 214; standing near the conflux of the Irk and the Irwell, about three miles from the Mersey.

Manchester was accounted a large and populous town even 50 years ago; but since that time it is supposed to have increased in more than a triple proportion, both in respect to buildings and inhabitants. In 1800 the number of houses was 12,547, of inhabitants 84,020: since that period the inhabitants have augmented to more than 100,000. Such has been the happy concurrence of ingenuity and industry, and such the astonishing improvements daily making in its numerous manufactures, together with the encouragement these afford to skilful artists in various branches, that streets must extend in proportion: yet population appears to have increased more rapidly than buildings; hence competitions naturally arise, and hence a temporary advance of rents. The manufactures of this town and neighbourhood, from humble domestic beginnings about two centuries ago, have now, after progressive improvements, acquired such celebrity, both in the scale of ornament and utility, as to spread in ten thousand forms and colours, not only in these kingdoms, but over all Europe, and even into the distant continents; being at once most precious mines of well-earned private wealth, and important contributors to the necessary public treasure of the state. Its post-office alone may afford an evidence of its extensive commerce. The population of the town may be further calculated from the great number of cotton factories within the boundaries of the town, wherein it is thought that 30,000 men, women, and children, are employed in the mere branches of preparing warp and weft. If to these be added the many hands applied to weaving, &c. &c. &c. beside all the more general mechanics, as well as householders, domestic servants, &c. Manchester may be ranked (except Liverpool) as the most populous market-town in Great Britain.

The college here was founded in 1422, by Thomas West, lord Delaware; and consisted of a warden, eight fellows, four clerks, and six choristers. About the same time the present collegiate church was built (timber only having been used for the former church), and John Huntington bachelor of laws was the first warden, named by the founder himself: he enjoyed the wardenship nearly 40 years; and a monument justly remains to his memory, he having been the first to propose and assist in the erection of the church. He died Nov. 11, 1458, and was interred in the middle of the choir.—This church is a fine structure of what is termed the Gothic system, and is more enriched with sculpture than such churches usually are. The tabernacle work over the stalls in the choir is very curious, as are the large arches added upon vaulting the choir. The organ, which cost not less than 1000l. is large and powerful. The last warden was Richard Murray, D. D. the 14th in succession. The college was new-founded in 1636; and Richard Heyrick, B. D. named the first warden on that foundation.—The present warden, Richard Asheton, D. D. rector of Middleton, is the fifth in succession from Richard Heyrick. The collegiate body now consists of a warden, four fellows, two chaplains, two clerks (one of whom, by a late regulation, is to be at least bachelor of arts and in priest's orders), four choristers, and four singing men.

Beside the collegiate church, there are also the following: St. Anne's, a handsome church, begun in 1709 and finished in 1723: it is the gift of the bishop of Chester. St. Mary's, built by the clergy of the collegiate church, and consecrated upwards of 36 years ago, is a neat and indeed an elegant edifice; as is St. John's, which was built about 26 years since by the late Edward Byrom, Esq. The next presentation thereof is, by act of parliament, vested in his heirs, afterwards devolving to the warden and fellows of the collegiate church. St. Paul's church was erected upwards of 18 years ago; and is a handsome spacious building, chiefly brick; to which has been added, within the last eight years, a lofty and substantial stone tower. St. James's church has been erected about 16 years: it is a large well-lighted building of brick and stone, with a small stone steeple. St. Michael's is also of brick and stone, with a square tower. It was built by the late Rev. Humphrey Owen (one of the chaplains of the collegiate church, and rector of St. Mary's), in whose heirs the presentation is vested for a term of 60 years, and thencefor-

ward in the warden and fellows of the college. To these may be added, St. Thomas's, Ardwick Green; and Trinity church, Salford: for though the Irwell intervenes between Manchester and Salford, and each is governed by its respective constables; yet, being connected by three bridges, by mutual friendship, and by the common pursuit of universally useful manufactures and commerce, the two places are generally considered under the name of Manchester, as the borough of Southwark is not improperly deemed a part of the metropolis. In Salford there is likewise a methodist chapel, and a church dedicated to St. Stephen. In Manchester is a new church, finished six years ago, and called St. George's. St. Peter's church, at the end of Mosley-street, is a strong and elegant stone structure with a high spire: it is lighted, in a manner not very common, by six semicircular windows. Another church, called St. Clement's, was also begun in the year 1792, in Stephenson's square; and also one called the New Jerusalem church. Beside the fourteen churches above enumerated, there are, a catholic chapel, three large methodist chapels, a chapel for the people called quakers, and ten chapels for dissenters of other denominations.

Cheetham's Hospital, commonly called the College, because it was originally the place of residence of the warden and fellows, is deserving of particular notice. Humphrey Cheetham, of Clayton, near Manchester, Esq. having been remarkably successful in trade, in the middle of the last century bought the college, and liberally endowed it for the maintenance and education of 40 poor boys, admissible between the age of 6 and 10 years. By an improvement of the funds of the charity, the number of boys was increased to 60; and continued such till the Easter meeting of the feoffees in 1780, when another augmentation took place, and the number has since been constantly 80.—The townships, pointed out by the founder for objects of his charity, are the following, together with the respective numbers admitted from each: Manchester, original number 14, now 28; Salford 6, now 12; Droylsden 3, now 6; Crumpsall 2, now 4; Bolton-le-moors 10, now 20; Turton 5, now 10.—So that 89 persons are now annually provided for by this liberal benefactor; including for the hospital a governor, one man and five women servants; a school-master; and, on the library establishment, a librarian. (See an authentic letter in the Gent. Mag. for June 1792, p 521). The boys of this hospital are comfortably provided for till the age of 14, when they are further clothed, and with a premium placed apprentices to useful trades; and, in order to incite early habits of industry, to make them good servants, and at length good masters, it has been suggested to furnish some kind of easy employment for a small part of their time not engaged at school. The library, which occupies an extensive gallery of the same building, owes its foundation and increasing importance to the same benevolent source. The annual value of the fund originally bequeathed for the purchase of books and for a librarian's salary was 116l.; but by recent improvements of the estate, the income is more than thrice that sum. The books at this time amount to 10,000 volumes, of which a catalogue handsomely printed in two vols. 8vo. has been published by the present librarian, the Rev. John Radcliffe, A. M. At stated hours on all days, except Sundays and other holidays, the studious may have free access to read, in the library, any book it contains; and in order to render it comfortable during the cold season of the year, several stoves are kept heated at the reading hours. This college and a large inclosed area are situated upon a high perpendicular rock, bounded by the Irk close to its confluence with the Irwell; and is thought by Mr. Whitaker to be included, as well as the collegiate church, within the boundaries of the ancient Roman prætorium; the whole of which site towards the Irwell, as on the side of the Irk, is considerably elevated above the water and the opposite land of Salford. The Free-school, higher up on the same side the Irk, almost joining to the college, is supported by the rents of three mills; one of which is for grinding malt, another for corn, and the third is employed as a snuff-mill. These rents are now increased to 700l. per annum, from which salaries are paid to three masters and two assistants. The scholars educated here have certain exhibitions allowed at the university; and such of them as are entered at Brazen-nose college, Oxford, have a chance of obtaining some valuable exhibitions arising from lands in Manchester bequeathed by Mr. Hulme.—The deserved reputation of this school is a powerful recommendation of its scholars entering at the universities. The Academy is a large and commodious building, raised by the subscriptions of several respectable dissenters, and placed under the care of able tutors. Here youth above 14 years of age are admitted and instructed in the various branches of liberal knowledge, preparatory to trade or the professions. The Literary and Philosophical Society of Manchester was instituted in the beginning of the year 1781, and is well known by its memoirs, of which several volumes 8vo. have been published; these have been translated into the German language.

A society was also established here in November 1789, under the name of the Lancashire Humane Society, for the encouragement of all who may attempt the recovery of persons apparently drowned. The Infirmary, Dispensary, Lunatic Asylum, and public Baths, are all situated on one large airy plot of land, in the most elevated and agreeable part of the town; a pleasant grass-plot and gravel-walk extending the whole length of the buildings; a canal intervening between them and the public street, next to which it is guarded by iron palisades. The Lying-in Hospital is situated in Salford, at the end of the old bridge. A new Work-house is completed; and for such a purpose a happier spot could not be found in any town than that whereon it is erected, being on an equal eminence with the

college on the opposite side of the Irk, and promising the greatest possible comforts to such as may be necessitated to become its inhabitants. The Exchange was a strong good building; but since the late act of parliament obtained for farther improvements of the town, it has been sold and taken down, and its site formed into a convenient area, to the great advantage of the surrounding houses. The Theatre is a neat building, wherein the boxes are placed in a semicircle opposite to the stage. The gentlemen's Concert-room is an elegant building, capacious enough to accommodate 1200 persons. The concerts are supported by annual subscriptions: but strangers and military gentlemen have free admission to the private concerts; as also to the public concerts, with a subscriber's ticket. The new assembly-rooms are large and commodious. A Circus is likewise built. Here are two Market-places, the old and the new; which are well supplied with every thing in season, though at high rates. There are several charity-schools belonging to different churches and chapels, where children are furnished with clothes and taught to read. The Sunday-schools are numerous, and afford instruction to upwards of seven thousand children. The Exchange and the Portico are both very fine buildings.

Over the Irwell are three bridges, uniting the town with Salford: the old bridge is very high at the Manchester end, whence it slopes into Salford. The middle bridge, four feet wide, raised upon timber and flagged, is only for accommodation of foot passengers, who from the Manchester side must descend to it by nearly forty steps. The lower bridge is a handsome stone building of two arches; this bridge affords a level road for two or three carriages abreast. It was undertaken and finished by the private subscription of a few gentlemen: and a small toll is taken for all passing, which toll is now annually let by auction, and pays the proprietors remarkably well.—From Manchester there are likewise the same number of bridges over the Irk; only one, however, is adapted for the passage of carriages. The Irwell having at a great expence been rendered navigable for vessels of 20 or 30 tons burden, there is a constant communication between Liverpool, Manchester, and the intermediate places on the Irwell and Mersey, to the great advantage of the proprietors and the country at large. This navigation, and more especially the duke of Bridgewater's canal, opening a passage from Manchester to the Mersey at 30 miles distance, have, together, greatly contributed to the present highly flourishing state of the town. Advantages still greater, because more widely diffusive, may result from the intended union of the Humber and the Mersey by means of canals. Indeed, every mile of canal would benefit many miles of land; and such would be the reciprocity of interest, that it would undoubtedly extend and be felt far beyond the visible measurement of the navigation.

We must not omit to mention the new penitentiary house, called the New Bailey, for separate confinement of various criminals.—Over the entrance is a large session-room, with adjoining rooms for the magistrates, council, jurors, &c. Beyond this, in the centre of a very large area inclosed by very high walls, stands the Prison, an extensive building, forming a cross, three stories high; and the four wards of each story may in an instant be seen by any person in its centre. This prison is kept surprisingly neat and healthy; and such as can work at any trade, and are not confined for crimes of the greatest magnitude, are employed in a variety of branches; so that one may be seen beating and cleansing cotton, another carding it, another roving, and a fourth spinning. In the next place may be observed a man or a woman busy at the loom; and in another, one or more engaged in cutting and raising the velvet pile. Hence industry is not suffered to slumber in the solitary cell, nor to quit it under the acquired impressions of that torpor which formerly accompanied the emancipated prisoner from his dungeon; rendering him, perhaps, totally unfit for the duties of honest society, though well qualified, in all probability, to herd with gamblers, and be then, if not before, initiated into their pernicious mysteries.—At Kersal-moor, three miles distant, horse-races are annually permitted. The banks of the rivers and various brooks about the town afford excellent situations for the numerous dye-houses employed for a multitude of fabrics. Among other things, the manufacture and finishing of hats is carried on to an extent of great importance. The general market is here on Saturday. Tuesday's market is chiefly for transacting business between the traders and manufacturers of the town and circumjacent country. The fairs are on Whit-Monday, October 1st, and November 17th.

Manchester is a manor with courts leet and baron. It sends no members to parliament, but gives title to a duke.

MANCHESTER, a town of Virginia, on James River, opposite to Richmond, with which it is connected by a bridge.

MA'NCHET. *s.* (*michet*, French. *Skinner*). A small loaf of fine bread (*More*)

MANCHINEEL TREE. See HIPPOMANE.

*To* MA'NCIPATE. *v. a.* (*mancipo*, Latin.) To enslave; to bind; to tie (*Hale*).

MANCIPA'TION. *s.* (from *mancipate.*) Slavery; involuntary obligation.

MA'NCIPLE. *s.* (*manceps*, Lat) The steward of a community; the purveyor (*Betterton*).

MANCUNIUM, a town of the Brigantes in Britain, situated where Manchester now stands.

MANCUS, in antiquity, an Anglo-Saxon gold coin, worth about 30 pence.

MANDAMUS, in law, a writ issuing out of the court of king's-bench, sent by the king, and directed to any person, corporation, or inferior court of judicature, within the king's dominions; requiring them to do some particular thing therein specified, which pertains

to their office and duty, and which the court of king's bench has previously determined, or, at least, supposes to be consonant to right and justice. This is a high prerogative writ, of a most extensively remedial nature; and may be issued in some cases where the injured party has also a more tedious method of redress, as in the case of admission or restitution to an office: but it issues in all cases where the party hath a right to any thing done, and hath no other specific means of compelling its performance. A mandamus, therefore, lies to compel the admission or restoration of the party applying to any office or franchise of a public nature, whether spiritual or temporal; to academical degrees; to the use of a meeting-house, &c. It lies for the production, inspection, or delivery of public books and papers; for the surrender of the regalia of a corporation; to oblige bodies corporate to affix their common seal; to compel the holding of a court, &c.

MANDARINS, a name given to the magistrates and governors of provinces in China, who are chosen out of the most learned men, and whose government is always at a great distance from the place of their birth. Mandarin is also a name given by the Chinese to the learned language of the country.

MA'NDATARY. *s.* (*mandataire*, French.) He to whom the pope has, by virtue of his prerogative, and his own proper right, given a mandate for his benefice (*Ayliffe*).

MA'NDATE. *s.* (*mandatum*, Latin.) 1. Command (*Howel*). 2. Precept; charge; commission, sent or transmitted (*Dryden*).

MANDA'TOR. *s.* (Latin.) Director (*Ayliffe*).

MA'NDATORY. *a.* (*mandare*, Latin.) Preceptive; directory.

MANDIBULA'. MANDIBLE. (*mandibula*, from *mando* to chew.) In anatomy usually applied to the lower jaw: in natural history, to both jaws. See MAXILLA INFERIOR.

MANDI'BULAR. *a.* (from *mandibula*, Lat.) Belonging to the jaw.

MANDILION. *s.* A soldier's coat.

MANDINGO, a kingdom of Africa, situated about 200 miles from the Atlantic, near the river Gambia. The Mandingoes are in general a lively, joyous people, who consume half their time in dancing, music, mirth, and good-humoured gaiety; yet being much addicted to company, warm and impetuous in their disposition, they fall into frequent quarrels, which commonly terminate in blood. Necessity and self-preservation oblige them to sow and reap, but this labour does not last above two months in a year; the other months are spent in idleness and sloth all the day, and at night in dancing under the shade. A few childish diversions they have, which they perform with abundance of address; but every thing manly is neglected: fishing and hunting are unknown, though no country affords better opportunities for both. Smoking tobacco is their whole pleasure, which increases their natural sloth, by destroying their appetite for food. It is of the growth of their country, and they smoke in wooden pipes, five or six feet in length, the bowl made of wood, hardened and dried in the fire, and finely polished. Immediately after a child is born he is bathed in cold water three or four times a day, and after being carefully dried, anointed with palm-oil along the spine, elbows, hams, and neck. They go naked to the age of eight or ten, and frequently paint their faces and neck for ornament. Every part of domestic economy is left to the care of the women, while the men cultivate the small quantities of rice wanted for the family, and pass away the rest of their time in idleness.—After laying up a quantity sufficient for the consumption of the family, the women have a right to dispose of the rest, but are accountable for the profits that arise to their husbands.—Many of the Mandingoes have a pride in keeping a crowd of slaves, whom they treat with such gentle usage, kindness, and humanity, that it is not easy to distinguish the master from the slave; especially the women, who wear necklaces, bracelets, and ear-rings, of amber, coral, and silver, as if the men had purchased them only to become their husbands. Most of these slaves are born in their families, and naturalized to them as their own children. In most other parts of Africa the master has a right to sell all slaves born in the family; but in Mandingo this action is treated as a crime, insomuch, that if any of them are disposed of without their consent, and against the will of their fellow-slaves, they all abandon their master, and seek a retreat in some other kingdom: for, though in this case he has no power to punish them, yet they reckon it dishonourable to enter into the service of another master in the same kingdom. Its principal town is Kamalia, situated in lat. 12. 40 N. lon. 6. 40 W.

MANDRAGORA. (*mandragora*, μανδραγορας, from μανδρα, a den, and αγειρω, to collect, because it grows about caves and dens of beasts; or from the German *man dragen*, bearing man). Mandrake. *Atropa mandragora* of Linnéus. The boiled root is employed in the form of poultice to discuss indolent tumours. See ATROPA

MANDRAKE. See MANDRAGORA and ATROPA.

MANDREL, a kind of wooden pulley, making a member of the turner's lathe. Of these there are several kinds; as flat mandrels, which have three or more little pegs or points near the verge, and are used for turning flat boards on. Pin mandrels, which have a long wooden shank to fit into a round hole made in the work to be turned. Hollow mandrels, which are hollow of themselves, and used for turning screws, &c.

*To* MA'NDUCATE. *v. a.* (*manduco*, Lat.) To chew; to eat.

MANDUCA'TION. *s.* (*manducatio*, Lat.) Eating (*Taylor*).

MANE. *s.* (*maene*, Dutch.) The hair which hangs down on the neck of horses, or other animals (*Sidney*).

MA'NEATER. *s.* (*man* and *eat.*) A cannibal; an anthropophagite.

MA'NED. *a.* (from *mane.*) Having a mane.

MANEGE. See MANAGE.

MANES, a son of Jupiter and Tellus, who reigned in Mæonia. He was father of Cotys by Calirrhoe, the daughter of Oceanus.

MANES, a name generally applied by the ancients to the souls when separated from the body. They were reckoned among the infernal deities, and generally supposed to preside over the monuments of the dead. They were worshipped with great solemnity, particularly by the Romans. Virgil introduces his hero as sacrificing to the infernal deities, and to the manes, a victim, whose blood was received in a ditch.

MANETHA, in botany, a genus of the class tetrandria, order monogynia. Calyx eight-leaved, superior; corol four-cleft; capsule inferior, two-valved, one-celled; seeds imbricate, orbicular, with a central seedlet. Five species: four natives of the West Indies and South America; one of Egypt: all shrubs, and generally with axillary peduncles and white flowers.

MANETHO, an ancient Egyptian historian, who pretended to take all his accounts from the sacred inscriptions on the pillars of Hermes Trismegistus. He was high-priest of Heliopolis in the time of Ptolemy Philadelphus, at whose request he wrote his history in Greek; beginning from their gods, and continuing it down to near the time of Darius Codomannus, who was conquered by Alexander the Great. His history of Egypt is a celebrated work, that is often quoted by Josephus and other ancient authors. Julius Africanus gave an abridgment of it in his Chronology. Manetho's work is however lost; and there only remain some fragments extracted from Julius Africanus, which are to be found in Eusebius's Chronica.

MANFREDI (Eustachio), a celebrated astronomer and mathematician, born at Bologna in 1674. His genius was always above his age. He was a tolerable poet, and wrote ingenious verses while he was but a child. And while very young he formed in his father's house an academy of youth of his own age, who became the Academy of Sciences, or the Institute, there. He became professor of mathematics at Bologna in 1698, and superintendant of the waters there in 1704. The same year he was placed at the head of the college of Montalte, founded at Bologna for young men intended for the church. In 1711 he obtained the office of astronomer to the Institute of Bologna. He became member of the Academy of Sciences of Paris in 1726, and of the Royal Society of London in 1729; and died the 15th of February, 1739.—His works are: 1. Ephemerides Motuum Cœlestium ab anno 1715 ad annum 1750; four volumes in quarto. The first volume is an excellent introduction to astronomy; and the other three contain numerous calculations. His two sisters were greatly assisting to him in composing this work. 2. De Transitu Mercurii per Solem, anno 1723. Bologna 1724, in quarto. 3. De Annuis Inerrantium Stellarum Aberrationibus, Bologna 1729, in quarto. Besides a number of papers in the Memoirs of the Academy of Sciences, and in other places. (*Hutton's Dictionary.*)

MA'NFUL. *a.* (*man* and *full.*) Bold; stout; daring (*Hudibras*).

MA'NFULLY. *ad.* Boldly; stoutly (*Ray*).

MA'NFULNESS. *s.* (from *manful.*) Stoutness; boldness.

MANGALORE, a seaport of Canara, on the coast of Malabar, with an excellent road for ships. It is inhabited by Gentoos and Mahometans. The former, on their festival days, carry their idols in triumph, placed in a waggon, adorned on all sides with flowers; and on the wheels are several sharp crooked iron hooks, upon which the mad devotees throw themselves, and are crushed to pieces. It is a place of great trade, and the Portuguese have a factory here for rice, and a large church frequented by black converts. The adjoining fields bear two crops of corn in a year; and the higher produce pepper, betel-nuts, sandal wood, iron, and steel. It is seated on a rising ground, 100 miles N. by W. of Tellicherry. Lon. 75. 24 E. Lat. 13. 8 N.

MANGANESE, in mineralogy. See MAGNESIATA.

MANGE: the itch of horses, dogs, and other quadrupeds, produced by a species of the acarus or itch insect burrowing under the cuticle; and hence, like the human itch, contagious. Meagre living, and, above all, uncleanliness, predisposes to this disease among quadrupeds as among mankind. It is destroyed by the same kinds of application, as hellebore, sulphur, and different preparations of quicksilver.

MANGEEA, an island in the S. Pacific Ocean, five leagues in circumference. In the interior parts it rises into small hills, and captain Cook represents it as a fine island; but the hostile appearance of its inhabitants obliged him to leave it soon. Lon. 158. 16 W. Lat. 21. 27 S.

MANGEL-WURZEL. See BETA.

MA'NGER. *s.* (*mangeoire*, French) The place or vessel in which animals are fed with corn (*L'Estrange*).

MA'NGINESS. *s.* (from *mangy.*) Scabbiness; infection with the mange.

MANGET (John James), an eminent physician, born at Geneva in 1652. The elector of Brandenburg made him his first physician in 1699; in which post he continued till his death, which happened at Geneva in 1742. He wrote many works; the most known of which are, 1. A collection of several Pharmacopœias, in folio. 2. Bibliotheca pharmaceutico-medica. 3. Bibliotheca anatomica. 4. Bibliotheca chemica. 5. Bibliotheca chirurgica. 6. A bibliotheca of all the authors who have written on medicine, in 4 vols. folio. All these works are in Latin. Daniel le Clerc, the author of a history of physic, assisted him in writing them.

MANGI'FERA. Mango-tree. In botany, a genus of the class pentandria, order mono-

gynia. Corol five-petalled; drupe kidney-form. Three species: trees of India and the Mauritius. The chief is the indica, with oblong-lanceolate leaves; flowers with about one stamen; drupe very large, kidney-form. The plant has never thriven in our own gardens. The drupe when ripe is highly esteemed in India; but in this country we know but little of it from its never succeeding as a seed, excepting in an unripe state, in which we receive it largely in the form of a pickle.

*To* MA'NGLE. *v. a.* (*mangelen*, Dutch; *maneus*, Latin.) To lacerate; to cut or tear piecemeal; to butcher (*Milton*). 2. To smoothen linen after it has been washed.

MANGLE, a valuable domestic machine, employed for the purpose of smoothing such linen as cannot be conveniently ironed.

Various patents have been granted for improvements in this machinery: of these we shall describe two. Mr. Stephen Clubbs' (patent dated September, 1805), is constituted chiefly of two hollow rollers, which may be conveniently about 2½ feet long and 14 inches diameter. They are not complete cylinders, but have about a fourth of the curve surface of each cut off by a plane running parallel to the axis of the cylinder. These hollow rollers being fixed in a stout frame, with their axles parallel to each other, and at about 14 inches distance, if they be turned round until the flat parts of each are brought near together, they will leave a space of about three inches to receive a small roller of that diameter, on which the linen is to be wound. The flat part of the upper roller is made to open so as to receive the materials which are put in to make it sufficiently heavy. A toothed wheel is fixed at one end of the upper roller, about two inches larger in diameter than the roller itself; and an equal toothed wheel is fixed at the opposite end of the lower roller. A horizontal axle carrying two pinions is so fixed that these pinions work into the teeth of both wheels; so that motion may be given to the whole by a winch at one extremity of this latter axle. The gudgeons at both ends of the upper roller, and at both ends of the axle carrying the pinions, should be joined by the connecting rods, and the whole have room to rise and fall three or four inches when occasion requires. The small roller is fixed in the frame by a button, which turns over the centre or spindle of it; and on the other side of the frame, the end of the cloth which goes round the linen winds up and down when the mangle is at work.

The patentee states three advantages as peculiar to his mangle, the first of which is founded upon an erroneous notion of theory, and is therefore omitted; the two latter of these we are inclined to allow, and therefore state them below.

"As the weight is constantly upon the linen, from the time it is introduced into the mangle until delivered out, the mangling must certainly be executed faster than if the linen were to be worked off of one roller upon another, as in the mangles of the usual construction.

"The weight used in my mangle is little more than half the weight required in any other mangle, consequently a little more than half the labour or power employed in other mangles will be necessary to set mine to work."

In Mr. J. Morris's patent mangle, two horizontal parallel cylindrical rollers form a bed for the roller on which the linen to be mangled is rolled; one of them *b* is seen in fig. 14. pl. 99. the axis of those rollers bear on brass, let into the wood frame, and have a wheel fixed to each, which works in a pinion on the axis of the fly wheel, as seen in the drawing, *c*, a moveable roller on which the linen to be mangled is rolled. *d*, A roller, the axis of which works in pieces of brass which slides between iron, let into the inner side of the wood frame, to the bottom of which long pieces of iron, *f*, are fixed with hooks at their lower extremities, to which are attached the chains that support the scale or platform, *h*, where iron weights or any other heavy substance are placed, to the top of the brass in which the roller *d* works, the engine chains are fastened, which pass through apertures at each end of the top of the wood frame, and are there again fastened on the pulleys of the shaft *k* with a screw. *l* is a leaver fixed to the end of the shaft *k*.

To use the machine, press the leaver *l* and fasten it with the hook, which raises the roller *d* with the platform and weights attached to it; then take out the roller *c*, and roll the linen and mangling cloth round it, and replace it on the two bottom rollers, unhook the leaver *l* and the weights on the platform will press the roller *d* on the roller *c*; give motion to the fly wheel, and also to all the rollers, by turning the handle *m*, which in a short time will make the linen beautifully smooth; press down the leaver, fasten it with the hook, and take the roller *c* out: a spare roller is supplied; so that if two persons are employed, one may be filling it with linen, while the other is mangling.

MA'NGLER. *s.* (from *mangle.*) A hacker; one that destroys bunglingly; one that smooths linen with a mangle.

MANGO. The fruit of the mangifera indica of Linnéus, which is cultivated all over Asia. When ripe it is juicy, of a good flavour, and so fragrant as to perfume the air to a considerable distance. It is eaten rather raw, or preserved with sugar. Its taste is so luscious, that they soon pall the appetite. The unripe fruits are pickled in the milk of the cocoa nut that has stood until sour, with salt, capsicum, and garlic. See MANGIFERA.

MANGO FISH. See POLYNEMUS.

MANGOSTAN. MANGOSTEEN. A fruit about the size of an orange, which grows in great abundance on the tree called garciniamangostana by Linnéus, in Java and the Molucca islands. According to the concurring testimonies of all travellers, it is the most exquisitely flavoured and the most salubrious of all fruits, it being such a delicious mixture of the tart and sweet. The flesh is juicy, white, almost transparent, and of a more delicate and agreeable flavour than the richest grape. It is

eaten in almost every disorder, and the dried bark is used medicinally in dysenteries and tenesmus, and a strong decoction of it is much esteemed as a gargle in ulcerated sore throats. See GARCINIA.

MANGOSTEEN BARK. See MANGOSTEEN.

MANGROVE TREE. See RHIZOPHORA.

MA'NGY. *a.* (from *mange*.) Infected with the mange; scabby (*Shakspeare*).

MANHA'TER. *s.* (*man* and *hater*.) Misanthrope; one that hates mankind.

MANHEIM, a town of Germany, in the Lower Palatinate, with a very strong citadel, and a palace, where the elector palatine often resides. It is seated at the confluence of the rivers Neckar and Rhine, in lon. 8. 33 E. lat. 40. 25 N.

MA'NHOOD. *s.* (from *man*.) 1. Human nature (*Milton*). 2. Virility; not womanhood (*Dryden*). 3. Virility; not childhood (*Pope*). 4. Courage; bravery; resolution; fortitude.

MANIA. (*mania*, *μανια*, from *μαινομαι*, to rage.) Raving or furious madness. A genus of disease in the class neuroses and order vesaniæ of Cullen, characterized by a conception of false relations, and an erroneous judgment, arising from imaginary perceptions or recollections, exciting the passions, and producing unreasonable actions or emotions, with a hurry of mind in pursuing a train of thought, and in running from one train of thought to another; attended with incoherent and absurd speech, called raving, and violent impatience of either contradiction or restraint.

MANI'AC. MANI'ACAL. *a.* (*maniacus*, Lat.) Raging with madness (*Grew*).

MANICHEES, or MANICHEANS, MANICHÆI, a sect of ancient heretics, who asserted two principles; so called from their author Manes, or Manichæus, a Persian by nation, and educated among the Magi, being himself one of that number before he embraced christianity.

This heresy had its first rise about the year 277, and spread itself principally in Arabia, Egypt, and Africa. St. Epiphanius, who treats of it at large, observes, that the true name of this heresiarch was Cubricus; and that he changed it for Manes; which in the Persian or Babylonish language signifies vessel. A rich widow, whose servant he had been, dying without issue, left him store of wealth; after which he assumed the title of the apostle or envoy of Jesus Christ.

Manes was not contented with the quality of apostle of Jesus Christ, but he also assumed that of the paraclete, whom Christ had promised to send: which Augustin explains by saying, that Manes endeavoured to persuade men that the Holy Ghost did personally dwell in him with full authority. He left several disciples, and, among others, Addas, Thomas, and Hermas. These he sent, in his life-time, into several provinces to preach his doctrine.—Manes, having undertaken to cure the king of Persia's son, and not succeeding, was put in prison upon the young prince's death; whence he made his escape; but he was apprehended soon after, and flayed alive.

The doctrine of Manes was a motley mixture of the tenets of Christianity with the ancient philosophy of the Persians, in which he had been instructed during his youth. He combined these two systems, and applied and accommodated to Jesus Christ the characters and actions which the Persians attributed to the god Mithras.

He established two principles, viz. a good and an evil one: the first, a most pure and subtile matter, which he called light, did nothing but good; and the second, a gross and corrupt substance, which he called darkness, nothing but evil. This philosophy is very ancient; and Plutarch treats of it at large in his Isis and Osiris.

Our souls, according to Manes, were made by the good principle, and our bodies by the evil one; those two principles being, according to him, coeternal, and independent of each other. Each of these is subject to the dominion of a superintending being, whose existence is from all eternity. The being who presides over the light is called God; he that rules the land of darkness bears the title of hyle or demon. The ruler of the light is supremely happy, and in consequence thereof benevolent and good: the prince of darkness is unhappy in himself, and desirous of rendering others partakers of his misery, and is evil and malignant. These two beings have produced an immense multitude of creatures, resembling themselves, and distributed them through their respective provinces. After a contest between the ruler of light and the prince of darkness, in which the latter was defeated, this prince of darkness produced the first parents of the human race. The beings engendered from this original stock consist of a body formed out of the corrupt matter of the kingdom of darkness, and of two souls, one of which is sensitive and lustful, and owes it existence to the evil principle; the other rational and immortal, a particle of that divine light, which had been carried away in the contest by the army of darkness, and immersed into the mass of malignant matter. The earth was created by God, out of this corrupt mass of matter, in order to be a dwelling for the human race, that their captive souls might, by degrees, be delivered from their corporeal prisons, and the celestial elements extended from the gross substance in which they were involved. With this view God produced two beings from his own substance, viz. Christ and the Holy Ghost: for the Manicheans held a consubstantial Trinity. Christ, or the glorious intelligence, called by the Persians Mithras, subsisting in and by himself, and residing in the sun, appeared in due time among the Jews, clothed with the shadowy form of a human body, to disengage the rational soul from the corrupt body, and to conquer the violence of malignant matter. The Jews, incited by the prince of darkness, put him to an ignominious death, which he suffered not in reality, but only in appearance, and according to the opinion of

men. When the purposes of Christ were accomplished he returned to his throne in the sun, appointing apostles to propagate his religion, and leaving his followers the promise of the paraclete or comforter, who is Manes, the Persian. Those souls who believe Jesus Christ to be the son of God, renounce the worship of the god of the Jews, who is the prince of darkness, and obey the laws delivered by Christ, and illustrated by Manes, the comforter, are gradually purified from the contagion of matter; and their purification being completed, after having passed through two states of trial, by water and fire, first in the moon, and then in the sun, their bodies return to their original mass; for the Manicheans derided the resurrection of bodies; and their souls ascend to the regions of light. But the souls of those who have neglected the salutary work of purification pass, after death, into the bodies of other animals, or natures, where they remain till they have accomplished their probation. Some, however, more perverse and obstinate, are consigned to a severer course of trial, being delivered over, for a time, to the power of malignant aerial spirits, who torment them in various ways. After this a fire shall break forth and consume the frame of the world: and the prince and powers of darkness shall return to their primitive seats of anguish and misery, in which they shall dwell for ever. These mansions shall be surrounded by an invincible guard, to prevent their ever renewing a war in the regions of light.

Though the Manichees professed to receive the books of the New Testament, yet, in effect, they only took so much of them as suited with their own opinions. They first formed to themselves a certain idea or scheme of Christianity; and to this adjusted the writings of the apostles; pretending that whatever was inconsistent with this had been foisted into the New Testament by later writers, who were half Jews. On the other hand, they made fables and apocryphal books pass for apostolical writings; and even are suspected to have forged several others, the better to maintain their errors.

Towards the middle of the twelfth century the sect of Manichees took a new face, on occasion of one Constantine, an Armenian, and an adherer to it; who took upon him to suppress the reading of all other books besides the Evangelists, and the Epistles of St. Paul, which he explained in such manner, as to make them contain a new system of Manicheism. He entirely discarded all the writings of his predecessors; rejecting the chimeras of the Valentinians, and their thirty æons; the fable of Manes, with regard to the origin of rain, and other dreams; but still retained the impurities of Basilides. In this manner he reformed Manicheism, insomuch that his followers made no scruple of anathematizing Scythian, Buddas, called also Addas, and Terebinth, the contemporaries and disciples, as some say, and, according to others, the predecessors and masters of Manes, and even Manes himself, Constantine being now their great apostle. After he had seduced an infinite number of people, he was at last stoned by order of the emperor.

This sect prevailed in Bosnia and the adjacent provinces about the close of the fifteenth century; propagated their doctrines with confidence, and held their religious assemblies with impunity. See on the subject of this article, Mosheim's Eccl. Hist. vol. i. p. 239, &c. 8vo. edit. Lardner's Cred. of the Gospel Hist. vol. viii. passim.

MANICORDON, or MANICHORD, a musical instrument in form of a spinet; the strings of which, like those of the clarichord, are covered with little pieces of cloth, to deaden as well as to soften their sound, whence it is also called the dumb spinet.

MA'NIFEST. *a.* (*manifestus*, Latin.) 1. Plain; open; not concealed (*Romans*). 2. Detected (*Dryden*).

MA'NIFEST. *s.* (*manifeste*, French.) Declaration; public protestation (*Dryden*).

*To* MANIFE'ST. *v. a.* (*manifester*, French; *manifesto*, Latin.) To make appear; to make public; to shew plainly; to discover (*Hammond*).

MANIFESTA'TION. *s.* (from *manifest.*) Discovery; publication; clear evidence (*Tillotson*).

MANIFE'STIBLE. *a.* (properly *manifestable.*) Easy to be made evident (*Brown*).

MA'NIFESTLY. *ad.* (from *manifest.*) Clearly; evidently; plainly (*Swift*).

MA'NIFESTNESS. *s.* (from *manifest.*) Perspicuity; clear evidence.

MANIFESTO, a public declaration made by a prince in writing, shewing his intentions to begin a war or other enterprise, with the motives that induce him to it, and the reasons on which he founds his rights and pretensions.

MA'NIFOLD. *a.* (*many* and *fold.*) Of different kinds; many in number; multiplied; complicated (*Shakspeare*).

MANIFO'LDED. *a.* (*many* and *fold.*) Having many complications (*Spenser*).

MA'NIFOLDLY. *ad.* (from *manifold.*) In a manifold manner (*Sidney*).

MANI'GLIONS. *s.* (In gunnery.) Two handles on the back of a piece of ordnance.

MANIHOT, in botany. See JATROPHA.

MANIKIN. *s.* (*mannikin*, Dutch.) A little man (*Shakspeare*).

MANILA, or MANILLA, a town of the island of Lucon, of which it is the capital, as well as of the Philippine Islands; situated on a bay on the south-west coast. In compass it is two miles, in length two thirds of a mile; the shape irregular, being narrow at both ends, and wide in the middle, and well furnished with brass guns, and good out-works. The palaces of Manilla, though all of timber above the first floor, yet are beautiful from their handsome galleries. The streets are broad, but frequent earthquakes have spoiled their uniformity, by overthrowing houses and palaces, which are not rebuilt. Manilla contains about 3000 souls, of various mixtures, qualities, and complexions, produced by the conjunction of Spaniards, Indians, Chinese, Malabars, Blacks,

and others inhabiting that city, and the adjacent islands. Though Manilla be so small, if we look only on the circumference of its walls, and the number of its inhabitants, yet it will appear large if we include its suburbs; for within a musket-shot of the gate of Parian is the habitation of the Chinese merchants, called Sangleys, who in several streets have rich shops of silk, porcelain, and other commodities. Here are found such as exercise all arts and trades; so that all the wealth of the citizens runs through their hands, through the indolence of the Spaniards and Indians, who apply themselves to nothing. There are about 3000 of them in this suburb, and as many more throughout the islands. There were formerly forty thousand; but abundance of them were put to death in tumults they raised at several times, particularly that on St. Francis's eve, in 1603, after which they were prohibited staying in the island by his Catholic majesty. The Spaniards oppress the Chinese very much, not suffering them to be in christian houses at night, and obliging them to be without light in their houses and shops. Over the bridge adjoining to Parian are suburbs or hamlets, fifteen in all, inhabited by Japanese, Tagalis, and other nations, under the government of an alcaide. The houses are generally of wood, near the river, and standing on pillars, with steps going up to them. The roofs are covered with nipa, or palm-tree leaves, the sides of cane, and they ascend to them by ladders, because the ground is moist, and sometimes full of water. The castle or fort stands at the west end of the city, having the sea on one side, and the river on the other: it is styled the citadel of St. James, and was originally fortified in the shape of a triangle, having one bastion towards the sea, another towards the river, and a third at the west point, to cover the port, which is only fit for small vessels. In the year 1645 great part of this city was destroyed by an earthquake, and 3000 people perished in the ruins. In the year 1762 Manilla was taken by the English, and to save it from destruction it was agreed to pay a million sterling for its ransom. Lon. 120. 54 E. Lat. 14. 36 N.

Manilla islands. See Luçon and Philippine islands.

MANILIUS (Marcus), a Latin astronomical poet, who lived in the reign of Augustus Cæsar. He wrote an ingenious poem concerning the stars and the sphere, called Astronomicon; which, not being mentioned by any of the ancient poets, was unknown till about two centuries since, when it was found buried in some German library, and published by Poggius. There is no account to be found of this author but what can be drawn from his poem; which contains a system of the ancient astronomy and astrology, together with the philosophy of the Stoics. It consists of five books; though there was a sixth, which has not been recovered. In this work Manilius hints at some opinions, which later ages have been ready to glory in as their own discoveries. Thus, he defends the fluidity of the heavens, against the hypothesis of Aristotle: he asserts that the fixed stars are not at all in the same concave superficies of the heavens, and equally distant from the centre of the world: he maintains that they are all of the same nature and substance with the sun, and that each of them has a particular vortex of its own: and lastly, he says, that the milky way is only the united lustre of a great many small imperceptible stars; which indeed the moderns now see to be such through their telescopes.

The best editions of Manilius are, that of Joseph Scaliger, in 4to. 1600; that of Bentley, in 4to. 1738; and that of Edmund Burton, esq. in 8vo. 1783.

MANILLE, in commerce, a large brass ring in the form of a bracelet, either plain or engraven, flat or round. Manilles are the principal commodities which the Europeans carry to the coast of Africa, and exchange with the natives for slaves. These people wear them as ornaments on the small of the leg, and on the thick part of the arm above the elbow. The great men wear manilles of gold and silver; but these are made in the country by the natives themselves.

MA'NIPLE. *s.* (*manipulus*, Latin.) 1. A handful. 2. A small band of soldiers.

MANI'PULAR. *a.* (from *manipulus*, Lat.) Relating to a maniple.

MANIPULUS is also an ecclesiastical ornament, worn by the priests, deacons, and subdeacons in the Romish church. It consists of a little fillet in form of a stole, three or four inches broad, and made of the same stuff with the chasuble; signifying and representing an handkerchief which the priests in the primitive church wore on the arm to wipe off the tears they were continually shedding for the sins of the people. There still remains a mark of this usage in a prayer rehearsed by those who wear it: Merear, Domine, portare manipulum fletus et doloris.—The Greeks and Maronites wear two manipules, one on each arm.

Manipulus, among physicians, is used to signify a handful of herbs or leaves, or so much as a man can grasp in his hand at once; which quantity is frequently denoted by the abbreviature, M. or m.

MANIS, pangolin, in zoology, a genus of the class mammalia, order bruta. Toothless; tongue round, extensile; mouth narrowed into a snout; body covered above with moveable bony scales. Two species, as follow:

1. M. pentadactyla. Short-tailed manis. Feet five-toed; scales channelled at the base; imbricate, rounded, sharp at the edges; ears rounded, naked; under parts naked; tail flat, covered wholly with scales; length from six to eight feet including the tail. Inhabits Guinea, China, and India; when irritated, erects its scales; when attacked rolls up; except in the covering very much resembles the ant-eaters: feeds on ants and other insects, which it takes by laying its long tongue, covered with a glutinous saliva, across their path: from the strength of its scales it is able, when rolled up, to resist the force of the attack of the leopard,

*Manis.*

*M. Tetradactyla or Long-Tailed Manis.*

*Myrmecophaga.*

*M. Didactyla or Two-toed Ant Eater.*

*London, Published by Sherwood & Co. Paternoster Row, May 1st 1812.*

whose powerful claws are incapable of making any impression upon it: by twisting these scales round the trunk of the elephant it is said to be able to destroy this bulky animal.

2. M. tetradactyla. Long-tailed manis. Has a slender nose: both its nose and head smooth: its body, legs, and tail, guarded by long sharp-pointed striated scales: its throat and belly covered with hair: its legs short, with four claws on each foot, one of which is very small; its tail tapers, but ends blunt. Guinea is supposed to be its native country. These animals approach so near the genus of lizards, as to be accounted the link in the chain of beings which connects the proper quadrupeds with the reptile class. They grow to a great length. One preserved in the museum of the Royal Society, London, measured from the nose to the tail only fourteen inches; while the tail itself was a yard and half a quarter.

MANI'SURIS. In botany, a genus of the class polygamia; order monœcia. Hermaph. Calyx, glume two-valved, one-flowered, outer valve emarginate at the top and sides; corol less than the calyx; stamens three; styles eleven. Male: female in the lower side of same spike, standing more erect. Two species; one a native of the East, the other of the West Indies.

MANKI'LLER. *s.* (*man* and *killer.*) Murderer (*Dryden*).

MANKI'ND. *s.* (*man* and *kind.*) The race or species of human beings (*Raleigh*).

MA'NKIND. *a.* Resembling man, not woman, in form or nature (*Shakspeare*).

MA'NLESS. *a.* (*man* and *less.*) Without men; not manned (*Bacon*).

MA'NLIKE. *a.* (*man* and *like.*) Having the proper qualities of man (*Sidney*).

MA'NLINESS. *s.* (from *manly.*) Dignity; bravery; stoutness (*Locke*).

MANLIUS, a name common to many illustrious Romans, the most celebrated of whom are the following.—1. Manlius, surnamed Torquatus, a celebrated Roman, whose youth was distinguished by a lively and cheerful disposition. These promising talents were, however, impeded by a difficulty of speaking. In a war against the Gauls, he accepted the challenge of one of the enemy, whose gigantic stature and ponderous arms had rendered him terrible and almost invincible in the eyes of the Romans. The Gaul was conquered, and Manlius stripped him of his arms, and from the collar (*torquis*) which he took from the enemy's neck he was ever after surnamed Torquatus. Manilius was the first Roman who was raised to the dictatorship, without having been previously consul. The severity of Torquatus to his son has been deservedly censured. He put to death his son, because he had engaged the enemy, and obtained an honourable victory, without his permission. This uncommon rigour displeased many of the Romans, and from it all edicts and actions of severity have been called Manliana edicta.—2. Marcus, a celebrated Roman, whose valour was displayed in the field, even at the age of 16. When Rome was taken by the Gauls, Manlius fled into the capitol, which he defended when suddenly surprised in the night by the enemy. The action gained him the surname of Capitolinus. A law which Manlius proposed to abolish the taxes on the common people raised the senators against him. The dictator Corn. Cossus seized him as a rebel, but the people put on mourning, and delivered from prison their common father. This did not in the least check his ambition; he continued to raise factions, and even secretly to attempt to make himself absolute, till at last the tribunes of the people themselves became his accusers. He was tried in the Campus Martius, but when the distant view of the capitol which Manlius had saved seemed to influence the people in his favour, the court of justice was removed, and Manlius was condemned. He was afterwards, for raising factions in the state, thrown down from the Tarpeian rock, A. U. C. 371, and to render his ignominy still greater, none of his family were afterwards permitted to bear the surname of Marcus.—3. A Roman appointed judge between his son Silanus and the province of Macedonia. When all the parties had been heard, the father said, "It is evident that my son has suffered himself to be bribed; therefore I deem him unworthy of the republic and of my house, and I order him to depart from my presence." Silanus was so struck at the rigour of his father that he hanged himself.

MA'NLY. *a.* (from *man.*) 1. Manlike; becoming a man; firm; brave; stout; undaunted; undismayed (*Dryden*). 2. Not womanish; not childish (*Shakspeare*).

MA'NLY. *ad.* With courage like a man.

MANNA. (*manna*, μαννα, from *mana*, a gift, Syr. it being the food given by God to the children of Israel in the wilderness; or from *mahna*, what is it? an exclamation occasioned by their wonder at its appearance). The condensed juice of the flowering ash, or fraxinus ornus, foliis ovato-oblongis serratis petiolatis, floribus corollatis. Hort. Kew. Class polygamia; order diœcia; which is a native of the southern parts of Europe, particularly Sicily and Calabria. Many other trees and shrubs have likewise been observed to emit a sweet juice, which concretes upon exposure to the air, and may be considered of the manna kind, especially the fraxinus rotundifolia and excelsior, and the hedysarum altragi, a plant indigenous to Persia. (See HEDYSARUM.) In Sicily these three species of fraxinus are regularly cultivated for the purpose of procuring manna, and with this view are planted on the declivity of a hill with an eastern aspect. After ten years growth the trees first begin to yield the manna, but they require to be much older before they afford it in any considerable quantity. Although the manna exudes spontaneously upon the trees, yet in order to obtain it more copiously, incisions are made through the bark by means of a sharp crooked instrument; and the season thought to be most favourable for instituting this process is a little before dog-days commence, when the weather is dry and serene. Manna

is generally distinguished into different kinds, viz. the manna in tear, the canulated and flaky manna, and the common brown or fat manna. All these varieties seem rather to depend upon their respective purity, and the circumstance in which they are obtained from the plant, than upon any essential difference of the drug. The best manna is in oblong pieces, or flakes, moderately dry, friable, very light, of a whitish or pale yellow colour, and in some degree transparent: the inferior kinds are moist, unctuous, and brown. Manna is well known as a gentle purgative, so mild in its operation that it may be given with safety to children and pregnant women.

MA'NNER. *s.* (*maniere*, French.) 1. Form; method (*Dryden*). 2. Custom; habit; fashion (*New Testament*). 3. Certain degree (*Bacon*). 4. Sort; kind (*Atterbury*). 5. Mien; cast of the look (*Clarissa*). 6. Peculiar way; distinct mode of person (*Clarendon*). 7. Way; mode (*Atterbury*). 8. (In the plural.) Character of mind (*Addison*). 9. General way of life; morals; habits (*Bacon*). 10. Ceremonious behaviour; studied civility (*Dryden*).

MA'NNERLINESS. *s.* (from *mannerly*.) Civility; ceremonious complaisance (*Hale*).

MA'NNERLY. *a.* (from *manner*.) Civil; ceremonious; complaisant (*Rogers*)

MA'NNERLY. *ad.* Civilly; without rudeness (*Shakspeare*).

MANNERS, the plural noun, has various significations; as, the general way of life, the morals, or the habits, of any person or people; also ceremonious behaviour, or studied civility. See the next article.

MANNERS (Good), according to Swift, is the art of making those people easy with whom we converse.

Whoever makes the fewest persons uneasy is the best bred in the company.

As the best law is founded upon reason, so are the best manners. And as some lawyers have introduced unreasonable things into common law, so likewise many teachers have introduced absurd things into common good-manners.

One principal point of this art is to suit our behaviour to the three several degrees of men; our superiors, our equals, and those below us.

For instance, to press either of the two former to eat or drink is a breach of manners; but a tradesman or a farmer must be thus treated, or else it will be difficult to persuade them that they are welcome.

Pride, ill-nature, and want of sense, are the three great sources of ill-manners: without some one of these defects no man will behave himself ill for want of experience; or of what, in the language of fools, is called knowing the world.

Swift says, "I make a difference between good-manners and good-breeding; although, in order to vary my expression, I am sometimes forced to confound them. By the first I only understand the art of remembering and applying certain settled forms of general behaviour. But good-breeding is of a much larger extent: for, besides an uncommon degree of literature sufficient to qualify a gentleman for reading a play, or a political pamphlet, it taketh in a great compass of knowledge; no less than that of dancing, fighting, gaming, making the circle of Italy, riding the great horse, and speaking French; not to mention some other secondary or subaltern accomplishments, which are more easily acquired. So that the difference between good-breeding and good-manners lieth in this, that the former cannot be attained by the best understandings without study and labour; whereas a tolerable degree of reason will instruct us in every part of good-manners without other assistance.

"I can think of nothing more useful upon this subject than to point out some particulars wherein the very essentials of good-manners are concerned, the neglect or perverting of which doth very much disturb the good commerce of the world, by introducing a traffic of a mutual uneasiness in most companies.

"First, a necessary part of good-manners is a punctual observance of time at our own dwellings, or those of others, or at third places; whether upon matters of civility, business, or diversion; which rule, though it be a plain dictate of common reason, yet the greatest minister I ever knew was the greatest trespasser against it: by which all his business doubled upon him, and placed him in a continual arrear. Upon which I often used to rally him as deficient in point of good manners. I have known more than one ambassador and secretary of state, with a very moderate portion of intellectuals, execute their office with great success and applause by the mere force of exactness and regularity. If you duly observe time for the service of another it doubles the obligation; if upon your own account, it would be manifest folly, as well as ingratitude, to neglect it; if both are concerned, to make your equal or inferior attend on you to his own disadvantage is pride and injustice.

"Ignorance of forms cannot properly be styled ill-manners: because forms are subject to frequent changes; and consequently, being not founded upon reason, are beneath a wise man's regard. Besides, they vary in every country; and after a short period of time vary frequently in the same: so that a man who travelleth must needs be at first a stranger to them in every court through which he passeth; and perhaps, at his return, as much a stranger in his own; and, after all, they are easier to be remembered or forgotten than faces or names.

"Indeed, among the many impertinencies that superficial young men bring with them from abroad, this bigotry of forms is one of the principal, and more predominant than the rest; who look upon them not only as if they were matters capable of admitting of choice, but even as points of importance; and therefore are zealous upon all occasions to introduce and propagate the new forms and fashions they have brought back with them: so that, usually speaking, the worst-bred person in the company is a young traveller just arrived from abroad.

MA'NNIKIN. *s.* (*man* and *klein*, German.) A little man; a dwarf.

MANNINGTREE, a town in Essex, with a market on Tuesday; seated on the river Stour, which is here called Manningtree-water, 11 miles W. of Harwich, and 60 E.N.E. of London. Lon. 1. 12 E. Lat. 52. 0 N.

MA'NNISH. *a.* (from *man.*) Having the appearance of a man; bold; masculine; impudent (*Sidney*).

MANOMETER, or MANOSCOPE, an instrument to shew or measure the alterations in the rarity or density of the air.

The manometer differs from the barometer in this, that the latter only serves to measure the weight of the atmosphere or of the column of air over it; but the former, the density of the air in which it is found; which density depends not only on the weight of the atmosphere, but also on the action of heat and cold, &c. Authors, however, often confound the two together; and Mr. Boyle himself has given a very good manometer of his contrivance under the name of statical barometer, consisting of a bubble of thin glass, about the size of an orange, which being counterpoised when the air was in a mean state of density by means of a nice pair of scales, sunk when the atmosphere became lighter, and rose as it grew heavier.

The manometer used by captain Phipps in his voyage towards the North Pole consisted of a tube of a small bore, with a ball at the end. The barometer being at 29·7, a small quantity of quicksilver was put into the tube, to take off the communication between the external air and that confined in the ball and the part of the tube below this quicksilver. A scale is placed on the side of the tube, which marks the degrees of dilatation arising from the increase of heat in this state of the weight of the air, and has the same graduation as that of Fahrenheit's thermometer, the point of freezing being marked 32. In this state, therefore, it will shew the degrees of heat in the same manner as a thermometer. But when the air becomes lighter, the bubble inclosed in the ball, being less compressed, will dilate itself, and occupy a space as much larger as the compressing force is less; therefore the changes arising from the increase of heat will be proportionably larger; and the instrument will shew the differences in the density of the air, arising from the changes in its weight and heat. Mr. Ramsden found, that a heat equal to that of boiling water increased the magnitude of the air from what it was at the freezing point, by $\frac{414}{1000}$ of the whole. Hence it follows, that the ball and the part of the tube below the beginning of the scale is of a magnitude equal to almost 414 degrees of the scale. If the height of both the manometer and thermometer be given, the height of the barometer may be thence reduced, by this rule;

as the height of the manom. increased by 414,
to the height of the thermom. increased by 414,
so is 29·7, to the height of the barometer;
or if $m$ denote the height of the manometer, and $t$ the height of the thermometer; then

$$m + 414 : t + 414 :: 29{\cdot}7 : \frac{t+414}{m+414} \times 29{\cdot}7,$$

which is the height of the barometer.

Other kinds of manometers were made use of by general Roy, in his attempts to correct the errors of the barometer. "They were (says he), of various lengths, from four to upwards of eight feet: they consisted of straight tubes, whose bores were commonly from one-fifteenth to one-twenty-fifth of an inch in diameter. The capacity of the tube was carefully measured, by making a column of quicksilver, about three or four inches in length, move along it from one end to the other. These spaces were severally marked, with a fine-edged file, on the tubes; and transferred from them to long slips of pasteboard, for the subsequent construction of the scales respectively belonging to each. The bulb, attached to one end of the manometer at the glass house, was of the form of a pear, whose point being occasionally opened, dry or moist air could be readily admitted, and the bulb sealed again, without any sensible alteration in its capacity. The air was confined by means of a column of quicksilver, long or short, and with the bulb downward or upwards, according to the nature of the proposed experiment. Here it must be observed, that from the adhesion of the quicksilver to the tube, the instrument will not act truly, except it be in a vertical position; and even then it is necessary to give it a small degree of motion, to bring the quicksilver into its true place, where it will remain in equilibrio, between the exterior pressure of the atmosphere on one side, and the interior elastic force of the confined air on the other. Pounded ice and water were used to fix a freezing point on the tube; and by means of salt and ice, the air was further condensed, generally four, and sometimes five or six degrees below zero. The thermometer and manometer were then placed in a tin vessel among water, which was brought into violent ebullition; where, having remained a sufficient time, and motion being given to the manometer, a boiling point was marked thereon. After this the fire was removed, and the gradual descents of the piece of quicksilver, corresponding to every twenty degrees of temperature in the thermometer, were successively marked on a deal rod applied to the manometer. It is to be observed, that both instruments, while in the water, were in circumstances perfectly similar; that is to say, the ball and bulb were at the bottom of the vessel. In order to be certain that no air had escaped by the side of the quicksilver during the operation, the manometer was frequently placed a second time in melting ice. If the barometer had not altered between the beginning and end of the experiment, the quicksilver always became stationary at or near the first mark. If any sudden change had taken place in the weight of the atmosphere during that interval, the same was noted, and allowance made for it in afterwards proportioning the spaces. Long tubes, with bores truly cylindrical, or of any uniform figure, are scarcely ever

met with. Such, however, as were used in these experiments generally tapered in a pretty regular manner from one end to the other. When the bulb was downwards, and the tube narrowed that way, the column of quicksilver confining the air, lengthened in the lower half of the scale, and augmented the pressure above the mean. In the upper half, the column being shortened, the pressure was diminished below the mean. In this case, the observed spaces both ways from the centre were diminished in the inverse ratio of the heights of the barometer at each space, compared with its mean height. If the bore widened towards the bulb when downwards, the observed spaces, each way from the centre, were augmented in the same inverse ratio; but in the experiments on air less dense than the atmosphere, the bulb being upwards, the same equation was applied with contrary signs; and if any extraordinary irregularity took place in the tube, the corresponding spaces were proportioned both ways from that point, whether high or low, that answered to the mean. The observed and equated manometrical spaces being thus laid down on the pasteboard containing the measures of the tube; the 212° of the thermometer, in exact proportion to the sections of the bore, were constructed alongside of them: hence the coincidences with each other were easily seen; and the number of thermometrical degrees answering to each manometrical space, readily transferred into a table prepared for the purpose." (*Phil. Trans.* vol. 67.)

MANOR, MANERIUM, (*à manendo*, because the usual residence of the owner), seems to have been a district of ground held by lords or great personages; who keep in their own hands so much land as was necessary for the use of their families, which were called *terræ dominicales*, or demesne lands; being occupied by the lord, or *dominus manerii*, and his servants. The other, or tenemental lands, they distributed among their tenants; which, from the different modes of tenure, were called and distinguished by two different names.—First, book-land, or charter-land, which was held by deed under certain rents and free services, and in effect differed nothing from free socage lands: and from hence have arisen most of the freehold tenants who hold of particular manors, and owe suit and service to the same. The other species was called folk-land, which was held by no assurance in writing, but distributed among the common folk or people at the pleasure of the lord, and resumed at his discretion; being indeed land held in villenage. See VILLENAGE.

The residue of the manor, being uncultivated, was termed the lord's waste, and served for public roads, and for common of pasture to the lord and his tenants. Manors were formerly called baronies, as they still are lordships; and each lord or baron was empowered to hold a domestic court, called the court-baron, for redressing misdemeanors and nuisances within the manor, and for settling disputes of property among the tenants. This court is an inseparable ingredient of every manor; and if the number of suitors should so fail, as not to leave sufficient to make a jury or homage, that is, two tenants at the least, the manor itself is lost. All manors existing at this day must have existed as early as king Edward the First. 2 Black. 90. See COURT-BARON.

MANQUE'LLER. *s.* (man and cpellan, Saxon.) A murderer; a mankiller; a manslayer (*Carew*).

MANSE. *s.* (*mansio*, Latin.) 1. Farm and land. 2. A parsonage house.

MANSE, MANSUS, MANSA, or MANSUM; in ancient law-books, denotes an house, or habitation, either with or without land. (See HOUSE and MANSION.) The word is formed *a manendo*, abiding; as being the place of dwelling or residence.

MANSE (Capital), *Mansum Capitale*, denotes the manor-house, or lord's court. See MANOR.

MANSUS PRESBYTERI, is a parsonage or vicarage house for the incumbent to reside in. This was originally, and still remains, an essential part of the endowment of a parish-church, together with the glebe and tythes. It is sometimes called presbyterium. See PRESBYTERY.

MANSFELD, a city of Germany, and capital of a county of the same name, in the circle of Upper Saxony. Lon. 12. 55 E. Lat. 51. 35 N.

MANSFERRY, in ornithology. See FALCO.

MANSFIELD, a town of England, in the county of Nottingham; anciently a royal demesne, to which the kings of England used to retire for the sake of hunting, in Sherwood Forest; and a manor was held by Henry Fauconberg, for shoeing the king's horse when he came to Mansfield. It has considerable trade in corn and malt, and a manufacture of stockings. In the year 1304, it was almost destroyed by fire. It has a weekly market on Thursday: fourteen miles N. Nottingham, and 138 N.N.W. London. Lon. 1. 9 W. Lat. 53 10 N.

MANSILLA, a town of Spain, in Leon, 15 miles S.W. of the city of Leon. Lon. 4. 55 W. Lat. 42. 30 N.

MA'NSION. *s.* (*mansio*, Latin.) 1. The lord's house in a manor. 2. Place of residence; abode; house (*Dryden*). 3. Residence; abode (*Denham*).

MANSLA'UGHTER. *s.* (*man* and *slaughter.*) 1. Murder; destruction of the human species (*Ascham*).

MANSLAUGHTER, in law, is killing a man without any malice prepense, or forethought. The English law very humanely makes a distinction between a hasty and deliberate act: as when two persons on a sudden quarrel, fight, and one is killed; yet as it is done in a sudden heat of passion, and not with any premeditated malice, it is manslaughter, and not murder. See MURDER.

This crime may be either voluntary, as on a sudden loss of temper; as if a man is greatly

provoked, and kills the agressor, it is manslaughter; but if it appears that there was a sufficient cooling time for the heat of anger to subside, this shews deliberate revenge, and amounts to murder. Or it may be involuntary, but in the commission of some unlawful act: in which latter respect it differs from homicide per infortunium: as if one shoots off a gun in a highway, and where people often meet, and kills a man; or if he is shooting at game, and is not qualified or licensed, and kills another, it is manslaughter. And, in general, when an involuntary killing happens, in consequence of an unlawful act, it will be murder or manslaughter, according to the act which occasioned it.

It is evident from the nature of this crime that there can be no accessaries, because it must be done without premeditation; but when two men once fell out, and immediately fought, and the sword of one was broken, and his friend lent him another, with which he killed his antagonist, it was made manslaughter in both. Again: there were two men in a room quarreling; a brother of one of them standing at the door, who could not get in, cried out to his brother to make him sure, and the brother killed his antagonist: it was likewise manslaughter in both.

But if any person shall stab another, not having his weapon drawn, or not strucken first, so that he dies within six months, although it be not of malice aforethought, it is felony without benefit of clergy.

This crime, though felony, is within benefit of clergy; and the offender should be burnt in the hand, and forfeit all his goods and chattels; but by stat. 19 Geo. III. c. 74, it is made lawful for the court to commute this punishment for a moderate fine and imprisonment.

MA'NSLAYER. *s.* (*man* and *slay*.) One that has killed another (*Numbers*).

MANSOURA, a town of Egypt, which has a considerable trade in rice and sal-ammoniac. Here are likewise vast chicken ovens. It is seated on the E. side of the Nile, 24 miles S.S.W. of Damietta, and 60 N. of Cairo. Lon. 31. 36 E. Lat. 31. 10 N.

MANSU'ETE. *a.* (*mansuetus*, Lat.) Tame; gentle; not ferocious (*Ray*).

MA'NSUETUDE. *s.* (*mansuctudo*, Lat.) Tameness; gentleness (*Herbert*).

MANSURA, a town of Turkey in Asia, in Irac Arabia, situate on the Euphrates, where it is joined by a branch of the Tigris, 110 miles W.N.W. of Bassora.

MANTACA. See MATACA.

MANTCHEW TARTARS, a branch of the Mogul Tartars, whose ancestors conquered China in the 13th century, but were expelled by the Chinese in 1368. They inhabit the three departments of E. Chinese Tartary, called Leoa-tong, Kirin, and Tcitcicar. They retain the customs they brought from China.

MA'NTEL. *s.* (*mantel*, old French.) Work raised before a chimney to conceal it (*Wotton*).

MANTELE'T. *s.* (*mantelet*, French.) A small cloak worn by women.

MANTELETS, in the art of war, a kind of moveable parapets made of planks about three inches thick, nailed one over another, to the height of almost six feet, generally cased with tin, and set upon little wheels, so that in a siege they may be driven before the pioneers, and serve as blinds to shelter them from the enemy's small shot.

MANTES, a considerable town of France, in the department of Seine and Oise. King Philip Augustus died here in 1223; and here is the tomb of king John, in the church of a late chapter which he founded. The wines from the vineyard of the late Celestins, out of the town, are famous. Mantes is seated on the Seine, and over it is a bridge, the great arch of which, although elliptic, is 120 feet wide. It is 31 miles N.W. of Paris. Lon. 1. 51 E. Lat 49. 1 N.

MANTICORA, in zoology, a genus of the class insecta, order coleoptera. Antennas filiform, the joints cylindrical; feelers four, filiform; thorax rounded before, emarginate behind; head projecting; mandibles exserted; shells united; wingless. One species only; M. maxillosa; inhabitant of the Cape of Good Hope, with large black body, simple black legs.

MANTIGER, or MANTEGAR. See SIMIA.

MANTILE, in surgery, the name of a bandage.

MANTINEA, in ancient geography, a town of Arcadia in Peloponnesus, was taken by Adratus and Antigonus, and from the latter it was afterwards called Antigonia. It is famous for the battle which was fought there between Epaminondas at the head of the Thebans, and the combined force of Lacedæmon, Achaia, Elis, Athens, and Arcadia, about 363 years before Christ. The Theban general was killed in the engagement, and from that time Thebes lost its consequence among the Grecian states.

MANTIS. Soothsayer. In zoology, a genus of the class insecta, order hemiptera. Head unsteady; mouth armed with jaws; feelers filiform; wings four, membranaceous, convolute, the under ones plaited; fore-legs compressed, serrate or toothed beneath, armed with a single claw and lateral jointed process; the four hind ones smooth, and formed for walking; thorax (mostly) linear, elongated, and narrow. Sixty-four species, scattered over the globe, but all exotics: two or three of them worshipped by the Hottentots, as the ibis and ichneumon were of old by the Egyptians.

The most remarkable of these animals is the mantis gongylodes of China. The thorax is uncommonly long and narrow; the head small and flat, with two short filiform antennæ; behind these, two large polished eyes are placed; the rostrum has the shape of an awl, but often split towards the extremity into two points. The elytra, which cover two-thirds of the body of the insect, are reticulated, and crossed the one over the other; the wings which they cover are veined and diaphanous. The four hind legs have the appearance of being

winged, on account of those large membranous lobes which immerge from their joints. The anterior pair are armed with spines at their first articulation, and towards their extremities they are serrated on one side.

The insects of this genus possess a form the most romantic and extraordinary that is perhaps presented by any animated being; and so powerfully have their singular attitudes operated on the minds of the credulous and ignorant, that the superstition of other countries than Egypt has invested them with powers altogether unexemplified by any part of the history of animated nature. By the singular manner in which the mantis stretches out its fore-legs, it has acquired the reputation of a diviner, who could unfold all the secrets in the bosom of futurity; and because the insect often sits upon its four hind-legs, having the two fore ones raised up and folded together, the believing multitude have supposed it to be then holding intercourse with the Supreme Power, in the exercise of devotion, a circumstance from which it has obtained from the peasants of Languedoc the name of Pregadiou, or the God-prayer. It is in that province, where these animals abound, that the country people have also ascribed to the soothsayer another very commendable quality; that of obligingly shewing the way to strangers. This it is supposed to do, by that peculiar habit which it has of stretching its fore-legs sometimes to the right, and sometimes to its left side. These superstitions of the vulgar have been as favourable to the security of these animals, as they are disgraceful to human reason; for they have procured them protection from injury of every kind; the person who has the temerity to violate their hallowed frames being accounted guilty of sacrilege.

MANTLE, or MANTLE-TREE, in architecture, the lower part of the chimney, or that piece of timber which is laid across the jaumbs, and sustains the compartments of the chimney-piece.

MANTLE, or MANTLING, in heraldry, that appearance of folding of cloth, flourishing, or drapery, which in any achievement is drawn about a coat of arms. See HERALDRY.

MA'NTLE. *s.* (*mantell,* Welsh.) A kind of cloak or outer garment (*Hayward*).

*To* MA'NTLE *v. a.* (from the verb.) To cloak; to cover; to disguise (*Shakspeare*).

*To* MA'NTLE. *v. n.* 1. To spread the wings as a hawk in pleasure (*Milton*). 2. To joy; to revel (*Spenser*). 3. To be expanded; to spread luxuriantly (*Gay*). 4. To gather any thing on the surface; to froth (*Pope*). 5. To ferment; to be in sprightly agitation (*Smith*).

MANTO, in fabulous history, a daughter of the prophet Tiresias, endowed with the gift of prophecy. She was made prisoner by the Argives when the city of Thebes fell into their hands, and was sent to the god of Delphi, as the most valuable present they could make. Manto remained some time at Delphi, where she gave oracles. From Delphi she came to Claros in Ionia, where she established an oracle of Apollo. Here she married Rhadius the sovereign of the country. Manto afterwards visited Italy, where she married Tiberinus the king of Alba, or, the god of the river Tiber. From this marriage sprang Ocnus, who built a town in the neighbourhood, which, in honour of his mother, he called Mantua. She received divine honours after death.

MANTRAP, a well-known engine, constructed like a rat-trap, but of a larger size, for the purpose of catching petty depredators in gardens, orchards, &c.

Mantraps of this construction, however, inflict deep and sometimes dangerous wounds upon the depredator: it became, therefore, desirous to invent others which should secure a thief without much injuring him.

A contrivance for this purpose by sir Theophilus Biddulph; it consisted of a wooden box, containing two springs in iron barrels, and two chains passing over and round them; when this was set, the chains were withdrawn from round the barrels, and extended to a certain distance. A trigger then kept the trap from closing, the whole was then covered over with thin iron plates, so that if a person set his foot on these plates his leg dropped into the box, and the chains closed round it and held the leg; but as the box was about three feet square and a foot deep, it was requisite that it should at setting be let into the ground, which would be a work of considerable labour; and when done it would be difficult to dispose of the stuff from the hole, or to conceal the trap; and as the whole apparatus was cumbersome and expensive, it appeared to Mr. R. Salmon, of Woburn, not to be well applicable in practice. This gentleman, therefore, devised one which when set only requires that the two keys be withdrawn, and that the trap be covered with a few loose leaves or mould. To the trap he has attached a piece of chain and a screw to be screwed into the ground, so as to prevent its being carried away; against any person that may be caught such a precaution is perhaps unnecessary, for any person who is caught will find the jaws of the trap close so fast on the leg that he cannot drag the trap far without great pain, and will consequently be glad to stand still, and to call out for relief.

The following description of Mr. Salmon's mantrap is copied from the 27th vol. of the Transactions of the Society of Arts.

The principal figure (fig. 1. pl. 102.) is a perspective view of this machine. Fig. 1, ABC is a frame of wrought iron, about 18 inches square; it has an eye projecting from it to receive a short chain, the other end of which is fastened to an iron screw, shewn seperately at D, screwed into the earth by the key or handle E; this screw is about 14 inches long, and, when screwed into hard ground, will hold so firmly, that there is no danger of its being drawn out, even by two or three men, and having a small square end, it cannot be turned without the key or handle E; so that an offender would find it extremely difficult to remove the trap: *efeg* are two iron frames moving on centres in the frame ABC; these frames

## Mr. Salmon's Man-trap.

Fig. 1.

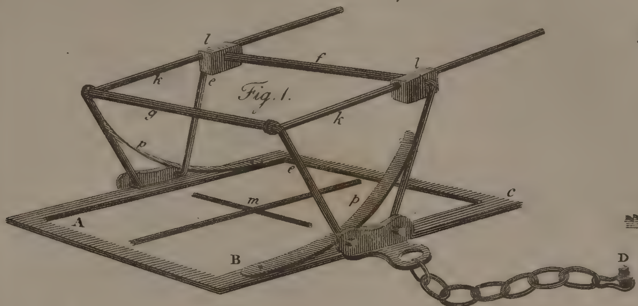
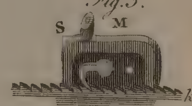
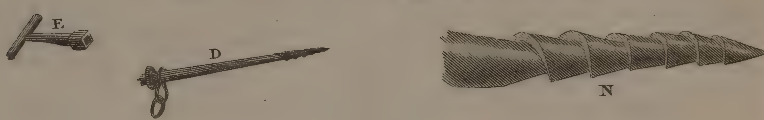



Fig. 2.


Fig. 3.




## Maps.

Fig. 1.

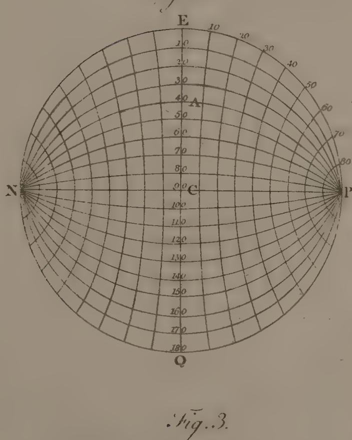



Fig. 2.

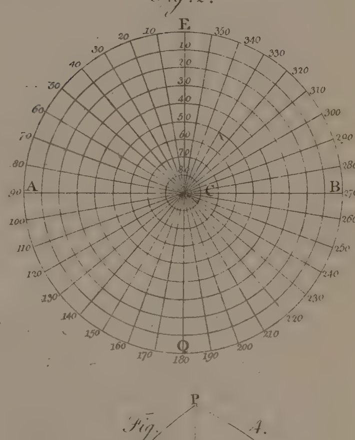



Fig. 3.

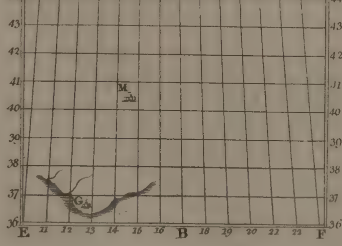
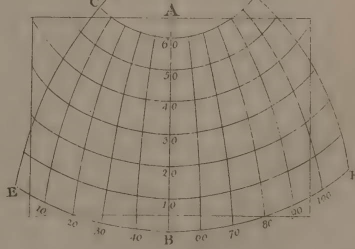



Fig. 4.




Mutlow, Sc. Russell Ct.

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have a constant tendency to close together, by means of two springs, *pp*, fixed in the frame AB, and acting against pins projecting from the upright sides of the moveable frame *ee*; *kk* are two small iron rods jointed to the upper rod of the moveable frame *g*, and passing through small locks, *ll*, fixed to the other frame *f*. These locks contain clicks which are pressed by springs into the teeth, as may be seen upon the rods *kk*, so as to prevent the two bars *fg* from being drawn asunder when they have been closed by means of the springs *pp*. The internal mechanism of the locks is explained by figures 2, 3, on a larger scale at LM, in the same plate; one side of the lock is supposed to be removed to exhibit its interior parts, where *k* represents the rack, or that part of the rod which is cut into teeth, *r* is the click, which engages the teeth of the rack, and prevents its being drawn through the lock: the click is pressed against the teeth of the rack by a spring, which is plainly seen in the figures; the locks are attached to the ends of the bar *f* of the moveable frame, by the bar passing through the locks, and when the lids are rivetted on it is confined in such a manner that it cannot be got out. But as it is necessary to open the bars *fg*, and draw the clicks back from the teeth of the racks, Mr. Salmon has contrived two different methods of accomplishing this object. Figure 3, M, is that which is used in the model left at the Society's Repository. A small key or screw S is put down through a hole in the lid of the lock, and is received into a hole lapped with a screw in the click; by turning the screw it lifts the click out of the teeth of the rack; so that the moving frames *fg* can be opened apart from each other, till they lie flat upon the frame AB. The iron cross *m* is then put between the two rods *fg*, the screws S of the two locks are to be withdrawn from the locks, and the trap is set for use. If an offender should place his foot within the square of the frame, he would tread down the cross *m*, and having thus removed the obstruction, the two frames *efeg* are closed together by the springs *pp*, so that the bars *fg* enclose his leg, and the clicks in the locks prevent the bars being opened without the screws S. In some of the machines which Mr. Salmon has made since the model was deposited with the society, the locks are made like figure 2, L, where a common key is to be introduced, and, when turned round, catches the tail of the click; it may have wards to prevent the using of a false key, though no ward is shewn in the plate.

Part of the screw D for securing the trap from being carried away by depredators is shewn on a larger scale at N, in order that the peculiar form of its threads may be better seen, which fix it firmly in the earth. Such screws would be very serviceable in fastening horses at grass, &c.

MANTUA, or MANTUAN, a duchy of Italy, lying along the river Po, which divides it into two parts. It is bounded on the N. by the Veronese, on the S. by the duchies of Reggio, Modena, and Mirandola; on the E. by the Ferrarese; and on the W. by the Cremonese. It is 50 miles long and 27 broad, and fruitful in corn, pastures, flax, fruits, and excellent wine. Charles IV, duke of Mantua, a prince of the empire, having taken part with the French, in the dispute relating to the succession of Spain, was put under the ban of the empire, and died in 1708. Having no heirs, the emperor kept the Mantuan, and the duke of Savoy had Montferrat, which were confirmed to them by subsequent treaties. After the death of the emperor in 1740, his eldest daughter, the queen of Hungary, kept possession of the Mantuan; and the governor of the Milanese had the administration of affairs. The Mantuan comprehends the duchies of Mantua and Sabioneta; the principalities of Castiglione, Soiforina, and Bosolo; likewise the county of Novellara. The principal rivers of this country are the Po, Oglio, and Minchio.

MANTUA, the capital of a duchy of the same name, in Italy, with an archbishop's see, and a university, seated on an island in the middle of a lake. The streets are broad and straight, and it has eight gates, twenty-one parishes, forty convents and nunneries, a quarter for the Jews to live in, and above 16,000 inhabitants. It is very strong by situation as well as by art, and there is no coming at it but by two causeways, which cross the lake; for which reason, it is one of the most considerable fortresses in Europe. It was greatly noted for its silks, and silk manufactures, which are now much decayed. The air in the summer is very unwholesome; and the lake is formed by the inundations of the Mincio. Virgil was born at a village near this city. Mantua was besieged by the French, for above six months, in 1796, and surrendered to them February 2, 1797. On the recommencement of the war, it was attacked by the Austrian and Russian army, to which it surrendered July 30, 1799, after a short siege; and finally, not only this city, but the whole country was subdued by Buonaparte. It is 35 miles N.E. of Parma, 22 S.W. of Verona, and 220 N. by W. of Rome. Lon. 10. 50 E. Lat. 45. 10 N.

MA'NTUA. *s.* (perhaps corrupted from *manteau*, French.) A lady's gown (*Pope*).

MA'NTUAMAKER. *s.* (*mantua* and *maker*.) One who makes gowns for women (*Addison*).

MANTUAN (Baptist), a famous Italian poet, born at Mantua in 1448. He took his name from the town; not having a right to that of his father, as being a natural son. In his youth he applied himself to Latin poetry, which he cultivated all his life; for it does not appear that he wrote any thing in Italian. He entered among the Carmelites, and became general of the order; though he quitted that dignity upon some disgust in 1515, and died the year following. The duke of Mantua, some years after, erected a marble statue to his memory, crowned with laurel, and placed it next to Virgil. His works were collected and published at Paris in three volumes folio in 1513,

with the commentaries of St. Murrhon, S. Brant, and I. Badius.

MA'NUAL. *a.* (*manualis*, Lat.) 1. Performed by the hand (*Dryden*). 2. Used by the hand (*Clarendon*).

MANUAL EXERCISE, in the army, consists in the observance of certain words of command, appointed for this purpose. When a regiment is drawn up, or paraded for exercise, the men are placed three deep, either by companies, or divided into platoons, with the grenadiers on the right. When soldiers are drawn up for exercise, the ranks and files should be exactly even; and each soldier should be instructed to carry his arms well, to keep his firelock steady and even upon his shoulder, with the right hand hanging down, and the whole body without constraint. The distances between the files must be equal, and the ranks eight feet distant from each other. Every motion should be performed with life, and the greatest exactness observed in all firings, wheelings, and marching; and therefore a regiment should never be under arms longer than two hours.

An abstract of the words of command at the manual exercise is given in several of our Encyclopædias; but as a far more complete direction may be bought for sixpence, by those who need them (seldom, we apprehend, readers of works like this), we shall excuse ourselves from inserting them here.

MANUAL, is the name of a service-book used in the church of Rome, containing the rites, directions to the priests, and prayers used in the administration of baptism and other sacraments; the form of blessing holy water, and the whole service used in processions. Hence,

MA'NUAL. *s.* A small book, such as may be carried in the hand (*Stillingfleet*).

MANU'BIAL. *a.* (*manubiæ*, Latin.) Belonging to spoil; taken in war.

MANU'BRIUM. *s.* (Latin.) A handle (*Boyle*).

MANUDU'CTION. *s.* (*manuductio*, Lat.) Guidance by the hand (*South*).

MANUDUCTOR, a name given to an ancient officer in the church; who, from the middle of the choir, where he was placed, gave the signal for the choristers to sing, and marked the measure, beat time, and regulated the music. The Greeks called him mesachoros, because seated in the middle of the choir: but in the Latin church he was called manuductor; from *manus* and *duco*, I lead; because he led and guided the choir by the motions and gesture of the hand.

MANUFA'CTURE. *s.* (*manus* and *facio*, Latin.) The practice of making any piece of workmanship. 2. Any thing made by art (*Addison*).

*To* MANUFA'CTURE. *v. a.* (*manufacturer*, French.) 1. To make by art and labour; to form by workmanship. 2. To employ in work; to work up.

MANUFA'CTURER. *s.* (*manufacturier*, Fr.) A workman; an artificer (*Watts*).

MANUFACTURES may be defined, the arts by which natural productions are brought into the state or form in which they are consumed or used. The principal manufactures are those which fabricate the various articles of clothing; as the woollen-manufacture, the leather-manufacture in part, the cotton-manufacture, the linen-manufacture, and the silk-manufacture; others supply articles of household furniture, as the manufactures of glass, porcelain, earthenware, and of most of the metals in part; the iron-manufacture furnishes implements of agriculture, and weapons of war; and the paper-manufacture supplies a material for communicating ideas and perpetuating knowledge. Manufactures had begun to flourish in different parts of Europe, long before they were attempted in Britain; the few articles of this description which were in request being obtained in exchange for wool, hides, tin, and such other produce as the country in a very uncultivated state could supply. In 1337, it was enacted, that no more wool should be exported; that no one should wear any but English cloth; that no cloths made beyond seas should be imported; that foreign clothworkers might come into the king's dominions, and should have such franchises as might suffice them. Before this time the English were little more than shepherds, and wool-sellers. The progress of improvement since the establishment of manufactures in this country has in most instances been remarkably great, particularly of late years, in consequence of an increased knowledge of the properties of various materials, vast improvements in all kinds of machinery, and the great capitals invested in most of the different branches. The value of British manufactures exported to all countries, on an average of six years, ending with 1774, was 10,342,019l.; the American war suspended for a time an important market for several of our manufactures, in consequence of which the total amount exported had fallen in 1781 to 7,633,332l. and on an average of six years, ending with 1783, it was 8,616,660l. During the peace which followed, the export trade rapidly revived, and, in the year preceding the war with France, had attained to a magnitude beyond all former example; it was checked a little by the mercantile embarrassments in 1793, but a few years after the unsettled state of several of the principal European powers threw many additional branches of foreign trade into the hands of our merchants, and carried the export of our manufactures to its present important extent. The real value of British produce and manufactures exported, as far as it can be ascertained, under the ad valorem duties, or computed at the average current prices of the goods, amounts to more than forty millions sterling.

Manufactures furnish employ for numerous families, but at the same time they greatly contribute to that depravity of manners for which the labouring classes are, at present, but too conspicuous. Indeed, it is a melancholy fact, that so long as agriculture is but partially attended to, and in a manner neglected, for the

more speedy acquisition of wealth, the progress of luxury necessarily tends to change the most virtuous habits, and to vitiate the morals of a mercantile nation.

By the 23 Geo. II. c. 13, it is enacted, that if any person export the tools or utensils used either in the silk, linen, or woollen manufactures, he incurs a forfeiture, and the sum of 200l.; and, if the captain of the ship be acquainted with such illegal proceeding, he is liable to pay a fine of 100l.—The forfeiture of the articles, and of 200l. is farther imposed on all persons collecting them for the purpose of exportation; and, if any captain of a king's ship, or officer of the customs, knowingly suffer such exportation, both (by the 21 Geo. III. c. 37), incur a penalty of 200l. lose their employment, and are for ever incapacitated from holding any office under government. This act likewise subjects all persons having tools in their possession, or procuring them to be made, with a view to exportation, to the forfeiture of the same, as well as of the sum of 200l. and to imprisonment for the term of 12 months. Lastly, the 22 Geo. III. c. 60, declares, that every person exporting such tools shall forfeit them, together with the sum of 500l. See Cloth, Cotton, Iron, Linen, &c.

MANU'LEA, in botany, a genus of the class didynamia, order angiospermia. Calyx five-parted; corol with a five-parted subulate border; the four upper divisions more united; capsule two-celled, many-seeded. Seventeen species; all herbaceous plants of the Cape.

*To* MANUM'ISE. *v. n.* (*manumitto*, Lat.) To set free; to dismiss from slavery (*Knolles*).

MANUMI'SSION. *s.* (*manumissio*, Lat.) The act of giving liberty to slaves (*Brown*).

*To* MANUMI'T. *v. a.* (*manumitto*, Latin.) To release from slavery (*Dryden*).

MANU'RABLE. *a.* (from *manure.*) Capable of cultivation (*Hale*).

MANU'RANCE. *s.* (from *manure.*) Agriculture; cultivation (*Spenser*).

*To* MANU'RE. *v. a.* (*manouvrer*, French.) 1. To cultivate by manual labour (*Milton*). 2. To dung; to fatten with composts (*Woodw.*). 3. To fatten as a compost (*Addison*).

Manu're. *s.* (from the verb.) Soil to be laid on land; dung to fatten land. See Husbandry.

MANU'REMENT. *s.* (from *manure.*) Cultivation; improvement (*Wotton*).

MANU'RER. *s.* (from the verb.) He who manures land; a husbandman.

MA'NUSCRIPT. *s.* (*manuscriptum*, Lat.) A book written, not printed (*Wotton*).

MANUTIUS (Aldus), the first of those celebrated Venetian printers who were as illustrious for their learning as for uncommon skill in their profession. He was born at Bassano in Italy about the middle of the 15th century; and hence is sometimes called Basianus, though generally better known by the name of Aldus. He was the first who printed Greek neatly and correctly; and acquired so much reputation by it, that whatever was finely printed was proverbially said to have "come from the press of Aldus." We have a kind of Greek grammar of his; with notes upon Homer, Horace, &c. He died at Venice, where he exercised his profession, in 1516.

Manutius (Paulus), son of the former, was brought up to his father's profession. He was more learned than him; and he acquired, by continual reading of Tully, such a purity in writing Latin, that even Scaliger allows a Roman could not exceed. Pope Pius IV. placed him at the head of the apostolical press, and gave him the charge of the Vatican library. His Epistles are infinitely laboured, and very correct; but, as may be said of most of the Ciceronians, they contain scarcely any thing but mere words. This constant reading of Tully, however, together with his profound knowledge of antiquity, qualified him extremely well for an editor of Tully; whose works he accordingly published, with commentaries on them, in 4 vols. folio, at Venice, in 1523. He died in 1574.

Manutius (Aldus), the younger, the son of Paulus, and the grandson of Aldus, was esteemed one of the greatest geniuses and most learned men of his time. Clement VIII. gave him the direction of the Vatican printing-house; but probably the profits of that place were very small, since Manutius was obliged, for his subsistence, to accept of a professor of rhetoric's chair, and to sell the excellent library that was in his family, which his father, his uncle, and his great-uncle, had collected with extraordinary care, and which it is said contained 80,000 volumes. He died at Rome in 1597, without any other recompense than the praises due to his merit. He wrote, 1. Commentaries on Cicero, 2. A Treatise on Orthography. 3. Three books of Epistles; and other works in Latin and Italian, which are esteemed.

MA'NY. *a.* comp. *more.* superl. *most.* (mæniᵹ, Saxon.) 1. Consisting of a great number; numerous; more than few (*Digby*). 2. Marking number indefinite (*Exodus*).

Ma'ny. *s.* 1. A multitude; a company; a great number; people (*Spenser*). 2. *Many* is used much in composition.

Many-cleft or multifid leaf, in botany. (See Cleft.) It is applied also to the corol.

Many-flowered glume and perianth, in botany. Gluma multiflora. Perianthium multiflorum. Inclosing several flowers. Many-flowered peduncle and stem. Pedunculus and caulis multiflorus. Supporting several flowers.

Many-fold corol, in botany. See Multiplicate.

Many-petalled corol, in botany. Polypetala. Opposed by Linnéus to a monopetalous or one-petalled corol. Other writers have commonly given separate names to the corol, according to the number of petals, as far as six; calling the rest polypetalous. Linnéus also makes the distinction of dipetalous, tripetalous, &c. but calls them all polypetalous.

MANY-VALVED GLUME, in botany. Multivalvis. Consisting of more than two valves, which is the common number.

MANYCO'LOURED. *a.* (*many* and *colour.*) Having various colours (*Donne*).

MANYCO'RNERED. *a.* (*many* and *corner.*) Polygonal; having many corners (*Dryden*).

MANYHEA'DED. *a.* (*many* and *head.*) Having many heads (*Sidney*).

MANYLA'NGUAGED. *a.* (*many* and *language.* Having many languages (*Pope*).

MANYPE'OPLED. *a.* (*many* and *people.*) Numerously populous (*Sandys*).

MANYTI'MES, an adverbial phrase. Often; frequently (*Addison*).

MAOUNA, one of the Navigators Islands, in the S. Pacific Ocean. Here, in 1787, M. de la Peyrouse, commander of the French ships the Boussole and Astrolabe, met with his first fatal accident; M. de Langle, captain of the Astrolabe, with 11 officers and sailors, being massacred by the natives. Lon. 169. 0 W. Lat. 14. 19 S.

MAP, a plane figure representing the surface of the earth, or some part of it; being a projection of the globular surface of the earth, exhibiting countries, seas, rivers, mountains, cities, &c. in their due positions, or nearly so.

Maps are either Universal or Particular, that is Partial.

MAPS (Universal), are such as exhibit the whole surface of the earth, or the two hemispheres.

MAPS (Particular, or Partial), are those that exhibit some particular region, or part of the earth.

Both kinds are usually called Geographical, or Land-Maps, as distinguished from Hydrographical, or Sea-Maps, which represent only the seas and sea-coasts, and are properly called Charts.

Anaximander, the scholar of Thales, it is said, about 400 years before Christ, first invented geographical tables, or maps. The Pentingerian Tables, published by Cornelius Pentinger, of Ausburgh, contain an itinerary of the whole Roman Empire; all places, except seas, woods, and desarts, being laid down according to their measured distances, but without any mention of latitude, longitude, or bearing.

The maps published by Ptolemy of Alexandria, about the 144th year of Christ, have meridians and parallels, the better to define and determine the situation of places, and are great improvements on the construction of maps. Though Ptolemy himself owns that his maps were copied from some that were made by Marinus, Tirus, &c. with the addition of some improvements of his own. But from his time till about the 14th century, during which geography and most sciences were neglected, no new maps were published. Mercator was the first of note among the moderns, and next to him Ortelinus, who undertook to make a new set of maps, with the modern divisions of countries and names of places; for want of which, those of Ptolemy were become almost useless. After Mercator, many others published maps, but for the most part they were mere copies of his. Towards the middle of the 17th century, Bleau in Holland, and Sanson in France, published new sets of maps, with many improvements from the travellers of those times, which were afterwards copied, with little variation, by the English, French, and Dutch; the best of these being those of Vischer and De Witt. And later observations have furnished us with still more accurate and copious sets of maps, by De Lisle, Robert, Wells, &c. &c. Concerning maps, see Varenius's Geog. lib. 3, cap. 3, prop. 4; Fournier's Hydrog. lib. 4, c. 24; Wolfius's Elem. Hydrog. c. 9; John Newton's Idea of Navigation; Mead's Construction of Globes and Maps; Wright's Constructions of Maps, &c.

MAPS (Construction of). Maps are constructed by making a projection of the globe, either on the plane of some particular circle, or by the eye placed in some particular point, according to the rules of perspective, &c.; of which there are several methods.

*First.—To construct a Map of the World, or a general Map.*

1st Method.—A map of the world must represent two hemispheres; and they must both be drawn upon the plane of that circle which divides the two hemispheres. The first way is to project each hemisphere upon the plane of some particular circle, by the rules of orthographic projection, forming two hemispheres, upon one common base or circle. When the plane of projection is that of a meridian, the maps will be the east and west hemispheres, the other meridians will be ellipses, and the parallel circles will be right lines. Upon the plane of the equinoctial, the meridians will be right lines crossing in the centre, which will represent the pole, and the parallels of latitude will be circles having that common centre, and the maps will be the northern and southern hemispheres. The fault of this way of drawing maps is, that near the outside the circles are too near one another; and therefore equal spaces on the earth are represented by very unequal spaces upon the map.

2d Method.—Another way is to project the same hemispheres by the rules of Stereographic projection; in which way, all the parallels will be represented by circles, and the meridians by circles or right lines. And here the contrary fault happens, viz. the circles towards the outsides are too far asunder, and about the middle they are too near together.

3d Method.—To remedy the faults of the two former methods, proceed as follows. First, for the east and west hemispheres, describe the circle PENQ for the meridian (Pl. 102, fig. 1), or plane of projection; through the centre of which draw the equinoctial EQ, and axis PN perpendicular to it, making P and N the north and south pole. Divide the quadrants PE, EN, NQ, and QP into 9 equal parts,

each representing 10 degrees, beginning at the equinoctial EQ: divide also CP and CN into 9 equal parts; beginning at EQ; and through the corresponding points draw the parallels of latitude. Again, divide CE and CQ into 9 equal parts; and through the points of division, and the two poles P and N, draw circles, or rather ellipses, for the meridians. So shall the map be prepared to receive the several places and countries of the earth.

Secondly, for the north or south hemisphere, draw AQBE, for the equinoctial (fig. 2), dividing it into the four quadrants EA, AQ, QB, and BE; and each quadrant into 9 equal parts, representing each 10 degrees of longitude; and then, from the points of division, draw lines to the centre C, for the circles of longitude. Divide any circle of longitude, as the first meridian EC, into 9 equal parts, and through these points describe circles from the centre C, for the parallels of latitude; numbering them as in the figure.

In this 3d method, equal spaces on the earth are represented by equal spaces on the map, as near as any projection will bear; for a spherical surface can no way be represented exactly upon a plane. Then the several countries of the world, seas, islands, sea-coasts, towns, &c. are to be entered in the map, according to their latitudes and longitudes.

In filling up the map, all places representing land are filled with such things as the countries contain; but the seas are left white; the shores adjoining to the sea being shaded. Rivers are marked by strong lines, or by double lines, drawn winding in form of the rivers they represent; and small rivers are expressed by small lines. Different countries are best distinguished by different colours, or at least the borders of them. Forests are represented by trees; and mountains shaded to make them appear. Sands are denoted by small points or specks; and rocks under water by a small cross. In any void space, draw the mariner's compass, with the 32 points or winds.

II.—*To draw a Map of any particular Country.*

1st Method.—For this purpose its extent must be known, as to latitude and longitude; as suppose Spain, lying between the north latitudes 36 and 44, and extending from 10 to 23 degrees of longitude; so that its extent from north to south is 8 degrees, and from east to west 13 degrees.

Draw the line AB for a meridian passing through the middle of the country (fig. 3), on which set off 8 degrees from B to A, taken from any convenient scale; A being the north, and B the south point. Through A and B draw the perpendiculars CD, EF, for the extreme parallels of latitude. Divide AB into 8 parts, or degrees, through which draw the other parallels of latitude, parallel to the former.

For the meridians; divide any degree in AB into 60 equal parts, or geographical miles. Then, because the length of a degree in each parallel decreases towards the pole, from the table shewing this decrease, under the article DEGREE, take the number of miles answering to the latitude of B, which is 48$\frac{1}{2}$ nearly, and set it from B, 7 times to E, and 6 times to F; so is EF divided into degrees. Again, from the same table take the number of miles of a degree in the latitude A, viz. 43$\frac{1}{6}$ nearly; which set off, from A, 7 times to C, and 6 times to D. Then from the points of division in the line CD, to the corresponding points in the line EF, draw so many right lines, for the meridians. Number the degrees of latitude up both sides of the map, and the degrees of longitude on the top and bottom. Also, in some vacant place make a scale of miles; or of degrees, if the map represent a large part of the earth; to serve for finding the distances of places upon the map.

Then make the proper divisions and subdivisions of the country; and having the latitudes and longitudes of the principal places, it will be easy to set them down in the map: for any town, &c. must be placed where the circles of its latitude and longitude intersect. For instance, Gibraltar, whose latitude is 36° 11′, and longitude 12° 27′, will be at G: and Madrid, whose latitude is 40° 10′, and lon. 14° 44′, will be at M. In like manner the mouth of a river must be set down; but to describe the whole river, the latitude and longitude of every turning must be marked down, and the towns and bridges by which it passes. And so for woods, forests, mountains, lakes, castles, &c. The boundaries will be described, by setting down the remarkable places on the sea-coast, and drawing a continued line through them all. And this way is very proper for small countries.

2d. Method.—Maps of particular places are but portions of the globe, and therefore may be drawn after the same manner as the whole is drawn. That is, such a map may be drawn either by the orthographic or stereographic projection of the sphere, as in the last prob. But in partial maps, an easier way is as follows. Having drawn the meridian AB (fig. 3), and divided it into equal parts as in the last method, through all the points of division draw lines perpendicular to AB, for the parallels of latitude; CD, EF being the extreme parallel. Then to divide these, set off the degrees in each parallel, diminished after the manner directed for the two extreme parallels CD, EF, in the last method: and through all the corresponding points draw the meridians, which will be curve lines; which were right lines in the last method; because only the extreme parallels were divided by the table. This method is proper for a large tract, as Europe, &c.: in which case the parallels and meridians need only be drawn to every 5 or 10 degrees. This method is much used in drawing maps; as all the parts are nearly of their due magnitude, but a little distorted towards the outside, from the oblique intersections of the meridians and parallels.

3d Method.—Draw PB of a convenient length, for a meridian; divide it into 9 equal parts, and through the points of division, describe as many circles for the parallels of latitude from the centre P, which represents the pole. Suppose AB (fig. 4) the height of the

map; then CD will be the parallel passing through the greatest latitude, and EF will represent the equator. Divide the equator EF into equal parts, of the same size as those in AB, both ways, beginning at B. Divide also all the parallels into the same number of equal parts, but lesser, in proportion to the numbers for the several latitudes, as directed in the last method for the rectilineal parallels. Then through all the corresponding divisions, draw curve lines, which will represent the meridians, the extreme ones being EC and FD. Lastly, number the degrees of latitude and longitude, and place a scale of equal parts, either of miles or degrees, for measuring distances.—This is a very good way of drawing large maps, and is called the globular projection; all the parts of the earth being represented nearly of their due magnitude, excepting that they are a little distorted on the outsides.

When the place is but small that a map is to be made of, as if a county was to be exhibited; the meridians, as to sense, will be parallel to one another, and the whole will differ very little from a plane. Such a map will be made more easily than by the preceding rules. It will here be sufficient to measure the distances of places in miles, and so lay them down in a plane rectangular map. But this belongs more properly to surveying.

*The Use of Maps* is obvious from their construction. The degrees of the meridians and parallels shew the latitudes and longitudes of places, and the scale of miles annexed, their distances; the situation of places, with regard to each other, as well as to the cardinal points, appears by inspection; the top of the map being always the north, the bottom the south, the right hand the east, and the left hand the west; unless the compass, usually annexed, shew the contrary. (*Hutton's Dict.*) See also *Phil. Trans.* new ab. part 42.

*To* MAP. *v. a.* (from the noun.) To delineate; to set down (*Shakspeare*).

MAPA'NIA, in botany, a genus of the class triandria, order monogynia. General involucre three-leaved; calyx six-valved; corolless. A grass of the woods of Guiana.

MAPLE, in botany. See ACER.

MAPLE SUGAR. See SUGAR.

MAPLETOFT (Dr. John), descended from a good family in Huntingdonshire, was born in 1631. He was educated in Trinity-college, Cambridge, and qualified himself for the profession of physic; and in 1675 was chosen professor of that art at Gresham-college. He translated Dr. Sydenham's Observationes medicæ circa morborum acutorum historiam et curationem into the Latin, and Sydenham dedicated them to Mapletoft. He married in 1679, and soon after transferred his studies from physic to divinity; took orders; obtained the vicarage of St. Laurence Jewry, with the lectureship of St. Christopher's in London; and having been a benefactor to Sion-college, was, in 1707, elected president. He continued to preach in the church of St. Laurence Jewry till he was above 80 years of age; and in his decline printed a book entitled, The principles and duties of the Christian religion, &c. 8vo. 1710, a copy of which he sent to every house in his parish. He was a polite scholar; and besides some other pieces on moral and theological subjects, there are in the Appendix to Ward's Lives of the professors of Gresham-college, three Latin lectures read there by him, on the origin of the art of medicine, and the history of its invention.

MAPPA, in the public games of the Roman circus, was a napkin hung out at the prætor's or other great magistrate's seat, as a signal for the race or other diversions to begin. The mappa was received by the mapparius, or person who held it, from the consul, prætor, or other great officer.

MA'PPERY. *s.* (from *map.*) The art of planning and designing (*Shakspeare*).

*To* MAR. *v. a.* (amẏrran, Saxon.) To injure; to spoil; to hurt; to mischief; to damage (*Dryden*).

MARACAYBO, a lake, or arm of the sea, in Terra Firma, lying in about 70° W. lon. and 10° N. lat. It opens into the Carribbean sea, is defended by strong forts, and has several Spanish towns seated on the coast.

MARACAYBO, a considerable town of Terra Firma, in the province of Venezuela. It carries on a great trade in skins and chocolate, which is the best in America; and it has very fine tobacco. It was taken by the French bucaniers in 1666 and 1678. It is seated near a lake of the same name, 70 miles S.W. of Venezuela. Lon. 70. 45 E. Lat. 10. 0 N.

MARACOCK, in botany, a name for one species of the PASSIFLORA, which see.

MARAGAL, a town of Persia, in the province of Aderbeitzan, 42 miles S. of Tauris. Lon. 47. 52 E. Lat. 37. 36 N.

MARAGNAN, a province of S. America, in Brasil, which comprehends a fertile populous island, 112 miles in circumference. The French settled here in 1612, and built a town; but they were soon expelled by the Portuguese. It has a castle, a harbour, and a bishop's see. Lon. 54. 55 W. Lat. 1. 20 S.

MARALDI (James Philip), a learned astronomer and mathematician, was born in 1665, at Perinaldo, in the county of Nice, a place already honoured by the birth of his maternal uncle the celebrated Cassini. Having made a considerable progress in mathematics, at the age of 22, his uncle, who had been a long time settled in France, invited him there, that he might himself cultivate the promising genius of his nephew. Maraldi no sooner applied himself to the contemplation of the heavens, than he conceived the design of forming a catalogue of the fixed stars, the foundation of all the astronomical edifice. In consequence of this design, he applied himself to observe them with the most constant attention; and he became by this means so intimate with them, that on being shewn any one of them, however small, he could immediately tell what constellation it belonged to, and its place in that constellation. He has been known to discover those small comets, which astronomers often take for the

stars of the constellation in which they are seen, for want of knowing precisely what stars the constellation consists of, when others, on the spot, and with eyes directed equally to the same part of the heavens, could not for a long time see any thing of them.

In 1700 he was employed under Cassini in prolonging the French meridian to the northern extremity of France, and had no small share in completing it. He then set out for Italy, where Clement the XIth invited him to assist at the assemblies of the congregation then sitting in Rome to reform the calendar. Bianchini also availed himself of his assistance to construct the great meridian of the Carthusian church in that city. In 1718, Maraldi, with three other academicians, prolonged the French meridian to the southern extremity of that country. He was admitted a member of the Academy of Sciences of Paris in 1699, in the department of astronomy, and communicated a great multitude of papers, which are printed in their memoirs, in almost every year from 1699 to 1729, and usually several papers in each of the years; for he was indefatigable in his observations of every thing that was curious and useful in the motions and phenomena of the heavenly bodies. As to the catalogue of the fixed stars, it was not quite completed; just as he had placed a mural quadrant on the terras of the observatory, to observe some stars towards the north and the zenith, he fell sick, and died the first of December, 1729.

MARANATHA, a Syriac word, which signifies *the Lord comes*, or *the Lord is come*; namely, to take vengeance; a form of threatening, cursing, or anathematizing used among the Jews. See 1 Corin. xvi. 22.

MARANTA, in botany, a genus of the class monandria, order monogynia. Calyx three-leaved; corol three-cleft; nectary three-parted, the third division bearing the anther on the upper side. Four species.

1. M. arundinacea. Indian arrow-root. Culm branched, herbaceous, leaves ovate, lanceolate, slightly hairy underneath; root fleshy, creeping, knotty; flowers white, terminal, in loose branches; capsule one-seeded. The plant rises about two feet high. A native of the West Indies; and in those islands serves as the common material for starch, which is obtained from the root well beaten first of all in a large mortar to a pulp, which is then dissolved in water, and the solution filtered, when a fine powdery substance will be precipitated, which, on being exsiccated by the sun, is the powder denominated starch: whence this vegetable possesses also the name of starch-plant. The root thus powdered and bleached is also sold in our own country, under the name of Indian arrow-root. A native of the West Indies.

Of the other three species: 2. M. touchas, a native of India and Cochinchina, with a creeping tubercled root and white flowers, has nothing very prominent appertaining to it. 3. M. mallaccensis, of Mallacca, is a doubtful plant, allied to the lostus mallaccensis of Kœnig; and 4. M. comosa, a native of Surinam, stemless, with spiked, comose scape, probably ought to form a new genus.

MARASMUS. (*marasmus*, μαρασμος, from μαρινω, to grow lean.) In medicine. Emaciation. A wasting away of the flesh.

MARATHA, in botany, a genus of the class cryptogamia, order filices. Fructification oval, scattered over the surface of the frond, many-celled, opening longitudinally on the upper side; cells opening in a double row; seeds numerous, ovate, minute. Three species; all exotics.

MARATHON, a village of Attica, 10 miles from Athens, celebrated for the victory which the 10,000 Athenians, and 1000 Platænians, under the command of Miltiades, gained over the Persian army, consisting of 100,000 foot, and 10,000 horse, or, according to Val. Maximus, of 300,000, or, as Justin says, of 600,000, under the command of Datis and Artaphernes, on the 28th of Sept. 490 B.C. In this battle, according to Herodotus, the Athenians lost only 162 men, and the Persians 6300. Justin has raised the loss of the Persians, in this expedition and in the battle, to 200,000 men. It was also in the plains of Marathon that Theseus overcame a celebrated bull, which plundered the neighbouring country.

MARATHROPHYLLUM. (*marathrophyllum*, μαραθροφυλλον, from μαραθον, fennel, and φυλλον, a leaf; so named because its leaves resemble those of the common fennel.) See Peucedanum.

MARATHRUM. (*marathrum*, μαραθρον, from μαραινω, to wither; so called because its stalk and flowers wither in the autumn.) See Fœniculum.

Marathrum sylvestre. See Peucedanum.

MARATTA. See Marhattas.

MARATTI (Carlo), an excellent Italian painter, born at Camerino, in the march of Ancona, in 1625. He became the pupil of Andrea Sacchi, and chiefly applied himself to painting madonnas and female saints. Pope Clement XI. gave him a pension, and conferred on him the order of knighthood. He was also painter in ordinary to Louis XIV. Maratti erected two noble monuments for Raphael and Hannibal, at his own expence, in the Pantheon. How well he maintained the dignity of his profession appears by his answer to a Roman prince, who complaining of the excessive price of his pictures, he told him there was a vast debt due from the world to the famous artists his predecessors, and that he, as their rightful successor, was come to claim those arrears. His abilities in painting were accompanied with many virtues, and particularly with an extensive charity. This great painter died at Rome in 1713, in the 88th year of his age.

MARAUDING, in a military sense, means the act of soldiers, who, without any order, go into the neighbouring houses and villages, when the army is either in camp or garrison, to plunder and destroy, &c. Marauders are a disgrace to the camp, to the military profes-

sion, and deserve no better quarter from their officers than they give to poor peasants, &c.

MARAVEDI, a little Spanish copper coin, worth somewhat more than a French denier, or half a farthing English.

MARBLE, in mineralogy. See MARMOR. In the language of the statuary and architect all stones come under the name of marble that are harder than gypsum, occur in considerable masses, and are capable of a good polish. Hence not only many varieties of limestone, but also granite, porphyry, serpentine, and even the fine-grained basalts, are called marble. Among mineralogists, however, the term is used in a more restricted sense, being confined to those varieties of dolomite, swine-stone, and compact, and granularly foliated lime-stone that are capable of receiving a considerable polish. Of these calcareous marbles the most valuable for hardness, durability, and colour, are procured from Italy, from the Greek islands, and from Syria: the ancient Romans, when at their height of civilized luxury, also obtained from Numidia and other rdistricts in Africa some highly esteemed varieties of marble.

The white granularly foliated lime-stone has always been the favourite material of the sculptors of ancient Greece and modern Europe, both on account of its pure colour, its delicate translucence, and its granular texture, which renders it much more easy to work than compact lime-stone. Dolomite possesses similar advantages, and is somewhat softer and of a finer grain: several of the smaller works of the Greek sculptors are of this material. The two great sources whence the statuary marble of Europe has been procured are Paros and Carrara. The Parian marble is the purest, consisting of hardly any thing else than carbonat of lime; hence it is softer, somewhat more transparent, and of a more visibly laminated texture than that of Carrara, which is mingled, often in considerable proportion, with granular quartz.

The most esteemed of the architectural marbles are the following.

1. A deep blue coloured marble, called bardiglio, from Carrara, which appears to differ only in colour from the white statuary marble of the same place.

2. Cipolin marble, which is statuary marble traversed by veins of mica.

3. Lumachelle marble, which is a secondary compact lime-stone of a grey or greyish brown colour, holding shells that still retain their pearly lustre. The fire marble of Bleyberey, in Carinthia, is the most valuable of this variety; the base is a greyish brown compact limestone, in which are implanted shells of a fire colour and beautiful iridescent lustre.

4. Florentine marble, which is a compact very argillaceous lime-stone, of a grey colour, with designs of a yellowish brown, representing architectural ruins.

5. The yellow marbles of Syria, Siena, and Arragon.

6. The green marble known by the names of campan, verde antiche verde di Corsica, &c. which are mixtures of granularly foliated lime-stone, calcareous spar, and serpentine, with threads of asbestos.

7. A very rich breccia, called brocatelli, containing small fragments of yellow, red, and purple lime-stone, cemented by semitransparent white calcareous spar.

Of the marbles that the British islands produce that of Tiree deserves the first place; and if its colours were not apt to fade, it might rank among the most beautiful even of Italy. The counties of Devonshire and Derbyshire also afford several varieties of considerable beauty, though by no means to be compared with the most esteemed of Italy and Spain.

MARBLES (Arundel). Marbles with a chronicle of the city of Athens inscribed on them (as was supposed) many years before our Saviour's birth; presented to the university of Oxford by Thomas earl of Arundel; whence the name. See ARUNDELIAN MARBLES.

MARBLES (Playing), are mostly imported from Holland; where it is said they are made by breaking the stone alabaster, or other substance, into pieces or chips of a suitable size; these are put into an iron mill which turns by water: there are several partitions with rasps within, cut floatways, not with teeth, which turn constantly round with great swiftness; the friction against the rasps makes them round; and as they are formed, they fall out of different holes, into which size or chance throws them. They are brought from Nuremberg to Rotterdam, down the Rhine, and from thence dispersed over Europe.

MA'RBLE. *a.* 1. Made of marble. (*Waller.*) 2. Variegated, or stained like marble (*Sidney*).

*To* MA'RBLE. *v. a.* (*marbler*, Fr.) To variegate, or vein like marble (*Boyle*).

MARBLEHE'ARTED, *a.* (*marble* and *heart.*) Cruel; insensible; hardhearted (*Shak.*)

MARBLED, something veined or clouded, resembling marble. See MARBLING.

MARBLED CHINA-WARE, a name given by many to a species of porcelain or china-ware, which seems to be full of cemented flaws. It is called by the Chinese, who are very fond of it, *tsou tchi.* It is generally plain white, sometimes blue, and has exactly the appearance of a piece of china which had been first broken, and then had all the pieces cemented in their places again, and covered with the original varnish. The manner of preparing it is easy, and might be imitated with us. Instead of the common varnish of the china-ware, which is made of what they call oil of stone and oil of fern mixed together, they cover this with a simple thing made only of a sort of coarse agates, calcined to a white powder, and separated from the grosser parts by means of water, after a long grinding in mortars. When the powder has been thus prepared, it is left moist, or in form of a sort of cream, with the last water that is suffered to remain in it, and this is used as the varnish. Our crystal would

serve full as well as those coarse agates, and the method of preparation is perfectly easy. The occasion of the singular appearance of this sort of porcelain is, that the varnish never spreads evenly, but runs into ridges and veins. These often run naturally into a sort of mosaic-work, which can scarce be taken for the effect of chance. If the marbled china be desired blue, they first give it a general coat of this colour, by dipping the vessel into a blue varnish; and when this is thoroughly dry, they add another coat of this agate-oil.

MARBLING, in general, the painting any thing with veins and clouds, so as to represent those of marble.

Marbling of books or paper is performed thus: dissolve four ounces of gum arabic in two quarts of fair water; then provide several colours mixed with water in pots or shells, and with pencils peculiar to each colour, sprinkle them by way of intermixture upon the gum water, which must be put into a trough, or some broad vessel; then with a stick curl them, or draw them out in streaks, to as much variety as may be done. Having done this, hold your book, or books, close together, and only dip the edges in, on the top of the water and colours, very lightly; which done, take them off, and the plain impression of the colours in mixture will be upon the leaves; doing as well the ends as the front of the book in the like manner, and afterwards glazing the colours.

MARBODUS, or MARBODÆUS, bishop of Rennes in 1096. He wrote De Gemmis, and some sacred poems; also the Life of Magnoboldus, bishop of Angers. He died in 1123.

MARCA (Peter de), a French divine, was born in 1594, in the province of Bearn, and educated among the jesuits. He was for some time counsellor of state, but having defended the liberties of the Gallican church in an elaborate treatise, he was made bishop of Conserans; after which he published a book to prove that St. Peter was the only head of the church, to ingratiate himself with the court of Rome. In 1652 he was nominated to the archbishopric of Toulouse, and the year following distinguished himself in a general assembly of the French clergy against the jansenists. He was afterwards appointed archbishop of Paris, and died in 1662, on the day that the bulls for his promotion arrived. After his death appeared his posthumous works, with prefaces, notes, &c. by M. Baluze.

MARCASITE, in mineralogy. See ARSENICUM, and METALLURGY.

MARCELLIANISM, the doctrines and opinions of the Marcellians, a sect of ancient heretics, towards the close of the second century, so called from Marcellus of Ancyra, their leader, who was accused of reviving the errors of Sabellius. Some, however, are of opinion, that Marcellus was orthodox, and that they were his enemies the Arians who fathered their errors upon him. St. Epiphanius observes, that there was a great deal of dispute with regard to the real tenets of Marcellus; but that, as to his followers, it is evident they did not own the three hypostases: for Marcellus considered the Son and Holy Ghost as two emanations from the divine nature, which, after performing their respective offices, were to return again into the substance of the Father; and this opinion is altogether incompatible with the belief of three distinct persons in the Godhead.

MARCELLINUS (Amianus), a Roman historian, who flourished under Constantius, Julian, and Valens. He wrote a history of Rome, from the reign of Domitian to that of Valens, which is to be valued on account of its veracity. It consisted of thirty-one books, of which only eighteen remain. The best editions are those of Gronovius, folio and 4to. L. Bat. 1693, and of Ernesti, 8vo. Lips. 1773.

MARCELLUS (Marcus Claudius), a famous Roman general, who, after the first Punic war, had the management of an expedition against the Gauls, where he obtained the *spolia opima*, by killing with his own hand Viridomarus the king of the enemy. Soon after he was entrusted to oppose Annibal in Italy, and was the first Roman who obtained some advantage over him. Marcellus, in his third consulship, was sent with a powerful force against Syracuse. He attacked it by sea and land, but his operations proved ineffectual, and the invention of a philosopher (Vid. ARCHIMEDES) baffled all the efforts, and destroyed all the great and stupendous military engines of the Romans, during three successive years. The perseverance of Marcellus at last obtained the victory. After the conquest of Syracuse, Marcellus was called upon to oppose a second time Annibal. He displayed as usual great military talents in his operations against this general, but was not, however, sufficiently vigilant against the snares of his adversary. He imprudently separated himself from his camp, and was killed in an ambuscade in the 60th year of his age, in his fifth consulship, A. U. C. 544. Marcellus claims our commendation for his private as well as his public virtues. (*Virg. Plut.*)—2. One of his descendants, who bore the same name, signalized himself in the civil wars of Cæsar and Pompey, by his firm attachment to the latter. Cicero undertook his defence in an oration which is still extant. —The grandson of Pompey's friend rendered himself popular by his universal benevolence and affability. He was son of Marcellus, by Octavia the sister of Augustus. He married Julia, that emperor's daughter, and was publicly intended as his successor. The suddenness of his death, at an early age, was the cause of much lamentation at Rome, and Virgil procured himself great favours by celebrating the virtues of this amiable prince. (Vid. OCTAVIA.) Marcellus was buried at the public expence. (*Virg. Æn. Suet. in Aug.* &c.)—4. The son of the great Marcellus, who took Syracuse, was caught in the ambuscade which proved fatal to his father, but he forced his way from the enemy and escaped. He received the ashes of his father from the conqueror (*Plut. in Marcell*).

MARCESCENT. (*marcescens*). In bo-

tany, withering, shrivelling. Contabescit nec decidit. Decaying without falling off. Applied to the perianth, in the class diadelphia: and to the corol, in campanula, orchis, cucumis, cucurbita, bryonia, &c.

MARCGRAVE, or MARGRAVE, a kind of dignity in Germany, answering to our marquis; (see MARQUIS.) The word is derived from the German Marche, or Marcke, which signifies "a frontier;" and Graffe, "count, governor;" marcgraves being originally governors of cities lying on the frontiers of a country or state.

MARCH, MARTIUS, the third month of the year, according to the common way of computing. See MONTH, and YEAR. Among the Romans, March was the first month; and in some ecclesiastical computations, that order is still preserved; as particularly reckoning the number of years from the incarnation of our Saviour; that is, from the 25th of March. It was Romulus who divided the year into months; to the first of which he gave the name of his supposed father Mars. Ovid, however, observes that the people of Italy had the month of March before Romulus's time: but that they placed it very differently, some making it the third, some the fourth, some the fifth, and others the tenth month of the year. In this month it was that the Romans sacrificed to Anna Perenna; that they began their comitia; that they adjudged their public farms and leases; that the mistresses served the slaves and servants at table, as the masters did in the Saturnalia; and that the vestals renewed the sacred fire. The month of March was always under the protection of Minerva, and always consisted of 31 days.—The ancients held it an unhappy month for marriage, as well as the month of May.

*To* MARCH. *v. n.* (*marcher*, French.) 1. To move in military form (*Shaksp.*) 2. To walk in a grave, deliberate, or stately manner (*Sidney. Davies*).

*To* MARCH. *v. a.* 1. To put in military movement (*Boyle*). 2. To bring in regular procession (*Prior*).

MARCH. *s.* (*marche*, French). 1. Military movement; journey of soldiers (*Blackmore*). 2. Grave and solemn walk (*Pope*). 3. Deliberate or laborious walk (*Addison*). 4. Signals to move (*Knolles*). 5. *Marches*, without singular. Borders: limits; confines (*Davies*).

MARCH. A military air or movement composed for trumpets, drums, and other martial instruments. There are various kinds of marches, as the Dead March, the Grand March, the Pompous March, the Quick Step, the Troop, &c.

MARCH (Ausias), a Spanish poet in the 15th century. He wrote amatory poems, and he and Petrarch are accused of having stolen from each other; but it is supposed that they both copied some poet older than themselves.

MARCH, or MERSH, a town of England, in the county of Cambridge, with a weekly market on Friday: twenty-six miles N. Cambridge, and seventy-nine N. London.

MARCHAND (Prosper), a French writer, who quitted France on account of his religion, and settled in Holland, where he conducted a Journal Littéraire. He died in 1756. He was the author of a History of Printing, an Historical Dictionary, and other works.

MARCHANTIA, in botany, a genus of the class cryptogamia, order hepaticæ. Male: Calyx salver-shaped, with numerous antlers imbedded in its disk. Fem.: Calyx peduncled, peltate, flowering underneath; capsules bursting at their summits; seeds attached to elastic fibres: twelve species; of which five are common to our own country.

MARCHE (La), before the revolution, a province of France, about fifty-five miles in length, and twenty in breadth. The land in general is not fertile, but feeds a great number of cattle. It now principally constitutes the departments of the Creuse and part of the department of the Vienne.

MARCHE (La), a town of France, and principal place of a district, in the department of the Vosges, situated near the source of the Mouzon: eight leagues and three quarters W.S.W. Epinal, and nine W.N.W. Luxeuil. Lon. 23. 27 E. Lat. 43. 4 N.

MARCHE (La), a small territory of Swisserland, in the canton of Schweitz, situated to the south of the lake of Zurich.

MARCHE, or MARCHE-EN-FAMENE, a town of the duchy of Luxemburg, situated on the river Marsette, in the road from Paris to Liege. In the year 1577, Don John of Austria, to appease the troubles of the Netherlands, convoked the principal malcontents to meet in this town; and produced what was called a Perpetual Edict; which was signed by Gerard de Groesbeck, cardinal bishop of Liege, Philip, baron of Wyneferg, president of the imperial council, and by Andrew Gaill, a celebrated lawyer, who were envoys on the part of the emperor; as also by two deputies of the duke of Juliers, and five of the states of the country, among whom was the bishop of Arras; while, on the other hand, the prince of Orange and several other nobles protested against it. The parish church, dedicated to St. Remacle, is a handsome structure: twenty miles S.E. Namur, and thirty-five N.W. Luxemburg.

MARCHENA, a handsome, ancient, and considerable town of Spain, in Andalusia, with the title of a duchy, and a suburb as large as the town, seated in the middle of a plain, particularly fertile in olives, though very destitute of water. Lon. 5. 20 W. Lat. 37. 20 N.

MA'RCHER. *s.* (from *marcheur*, French). President of the marches or borders (*Davies*).

MARCHESVAN, in chronology, the eighth month of the Jewish ecclesiastical year, answering to part of our October and November.

MARCHET, or MARCHETTA, a pecuniary fine, anciently paid by the tenant to his lord, for the marriage of one of the tenant's daughters.

This custom obtained, with some difference, throughout all England and Wales, and also

in Scotland; and it still continues to obtain in some places. According to the custom of the manor of Dinover in Carmarthenshire, every tenant, at the marriage of his daughter, pays ten shillings to the lord; which in the British language is called gwabr-merched, i. e. maid's-fee. See AMABYR.

In Scotland, and the north parts of England, the custom was, for the lord to lie the first night with the bride of his tenant; but this usage was abrogated by king Malcolm III. at the instance of his queen; and instead thereof, a mark was paid by the bridegroom to the lord: whence it is called marcheta mulieris. See BOROUGH ENGLISH.

MARCHIENNES, a town of the Austrian Netherlands, in the county of Namur, seated on both sides of the Sambre, four miles west of Charleroy, and 22 south-west of Namur. Lon. 4. 22 E. Lat. 50. 20 N.

MARCHIENNES, a village of France, in the department of the North, with a late abbey: seated in a morass, on the the river Scarpe, between Douay and St. Amand.

MA'RCHIONESS. *s.* The wife of a marquis.

MA'RCHPANE. *s.* (*massepane*, Fr.). A kind of sweet bread, or biscuit (*Sidney*).

MARCHPURG, a town of Germany, in the duchy of Stiria, with a strong castle, seated on the Drave, 18 miles west of Pettaw, and 25 S.S.W. of Gratz. Lon. 15. 19 E. Lat. 46. 44 N.

MARCIANA SILVA, the ancient name of the Black Forest.

MARCIANA, a sister of the emperor Trajan, who, on account of her public and private virtues, was declared Augusta and empress by her brother. She died A. D. 113.

MARCIANOPOLIS, the capital of Lower Mœsia in Greece.

MARCIANUS, a native of Thrace, born of an obscure family. After he had served in the army as a common soldier, and by his uncommon talents raised himself to higher stations, he was, on the death of Theodosius II. A. D. 450, invested with the imperial purple in the east. The subjects of the Roman empire had reason to be satisfied with their choice, as his reign has been distinguished by the appellation of the golden age.

MARCIONITES, or MARCIONISTS, MARCIONISTÆ, a very ancient and popular sect of heretics, who, in the time of St. Epiphanius, were spread over Italy, Egypt, Palestine, Syria, Arabia, Persia, and other countries: they were thus denominated from their author Marcion. Marcion was of Pontus, the son of a bishop, and at first made profession of the monastical life; but he was excommunicated by his own father, who would never admit him again into the communion of the church, not even on his repentance. On this, he abandoned his own country, and retired to Rome, where he began to broach his doctrines.

He laid down two principles, the one good, the other evil between these they imagined an intermediate kind of deity of a mixed nature, who was the creator of this inferior world, and the god and legislator of the Jewish nation: the other nations, who worshipped a variety of gods, were supposed to be under the empire of the evil principle.—These two conflicting powers exercise oppressions upon rational and immortal souls; and, therefore, the supreme God, to deliver them from bondage, sent to the Jews a being more like unto himself, even his son Jesus Christ, clothed with a certain shadowy resemblance of a body: this celestial messenger was attacked by the prince of darkness, and by the god of the Jews, but without effect. Those who follow the directions of this celestial conductor, mortify the body by fastings and austerities, and renounce the precepts of the god of the Jews, and of the prince of darkness, shall, after death, ascend to the mansions of felicity and perfection. The rule of manners which Marcion prescribed to his followers was excessively austere, containing an express prohibition of wedlock, wine, flesh, and all the external comforts of life. See MANICHÆANS.

Marcion denied the real birth, incarnation, and passion of Jesus Christ, and held them to be all apparent only. He denied the resurrection of the body; and allowed none to be baptized, but those who preserved their continence; but these, he granted, might be baptized three times.

In many things, he followed the sentiments of the heretic Cordon, and rejected the law and the prophets. He pretended, the gospel had been corrupted by false prophets, and allowed none of the evangelists, but St. Luke, whom also he altered in many places, as well as the epistles of St. Paul, a great many things in which he threw out. In his own copy of St. Luke, he threw out the two first chapters entire.

MARCITES, MARCITÆ, a sect of heretics in the second century, who also called themselves the perfecti, and made profession of doing every thing with a great deal of liberty, and without any fear.

This doctrine they borrowed from Simon Magus, who, however, was not their chief; for they were called Marcites from one Marcus, who conferred the priesthood, and the administration of the sacraments, on women.

MARCGRA'VIA, in botany, a genus of the class polyandria, order monogynia. Calyx six-leaved, imbricate; corol one-petalled, clavate, and closed like a veil; berry many-celled, many-seeded. Two species: both native shrubs of South America.

MA'RCID. *a.* (*marcidus*, Latin.) Lean; pining, withered (*Dryden*).

MARCIUS SABINUS (M.) was the progenitor of the Marcian family at Rome. He came to Rome with Numa, and it was he who advised Numa to accept of the crown, which the Romans offered to him. He attempted to make himself king of Rome, in opposition to Tullus Hostilius, and when his efforts proved unsuccessful, he killed himself. Marcius was a name common also to some other ancient Romans.

MARCOMANNI, a people of Germany, who originally dwelt on the banks of the Rhine and the Danube. They proved powerful enemies to the Roman emperors. Augustus granted them peace, but they were afterwards subdued by Antonius and Trajan, &c.

MARCOSIANS, or COLOBARSIANS, an ancient sect in the church, making a branch of the Valentinians.

MARCORES. (*marcor, oris,* from *marceo,* to become lean.) Universal emaciation. The first order in the class cachexiæ of Cullen's nosology.

MARCULUS, among the Romans, a knocker or instrument of iron to knock at the doors with.

MARDIKERS, or TOPASSES, a mixed breed of Dutch, Portuguese, Indians, and other nations incorporated with the Dutch at Batavia, in the East Indies.

MARE, the female of the horse kind. See the article HORSE. No mares in the world are better suited for breeding from than the English, provided they are properly chosen for the sort of horse intended to be bred. The mare, whatever sort of horse is intended to be raised from her, should be perfectly sound, and as free from all defects as the stallion. The highest spirited mares are the best; and, in general, if there be any natural defect in the mare, it should be remedied in the stallion; and if any in the stallion, it should be remedied in the mare, as much as possible, in order to the having good colts. See the articles BREEDING, DEFECTS, &c.

The particular directions regarding the kinds of horses to be bred are these: if for the manage, the mare should have her head well set on, and her breasts broad; her legs not too long, her eyes bright and sparkling; and her body large enough that the foal may have room. She should be of a good and gentle disposition, and her motions easy and graceful: in a word, the more good qualities the mare has, the better, in general, her colts will prove. See the article COLT.

If the owner would breed for racing, or for hunting, the mare must be chosen lighter, with short back and long sides; her legs must be longer, and the breast not so broad; and with good blood in her veins. If the speed and wind of any particular mare have been tried, and found good, there is the more certainty of a good colt from her; but she should be in full health and vigour at the time, and not above seven years old, or eight at the utmost. The younger the breeders are, the better, in general, the colts will be. A filly covered in her third year will generally produce a good colt in her fourth; and brood mares from an excellent stock will produce to their twentieth or twenty-fifth year. The best season for covering is May and June: and the time of gestation is from eleven to twelve months.

MARESTAIL, in botany. See EQUISETUM.

MA'RESCHAL. *s.* (*mareschal,* French.) A chief commander of an army (*Prior*).

MARENNES, a town of France, in the department of Lower Charente, remarkable for the green-finned oysters found near the coast, and its salt. It is seated near the Atlantic, 32 miles N.W. of Saintes, and 270 S.W. of Paris. Lon. 0. 49 W. Lat. 46. 15 N.

MAREOTIS, a lake in Egypt near Alexandria. Its neighbourhood was famous for wine; though some make the Mareoticum vinum grow in Epirus, or in a certain part of Libya, called also Mareotis, near Egypt.

MARETIMO, an island of Italy, on the W. coast of Sicily. It is 10 miles in circumference, has a castle, with a few farm-houses, and produces much honey. Lon. 12. 35 E. Lat. 38. 5 N.

MARGA. Marl. In mineralogy, a genus of the class earths, order calcareous. Consisting of carbonat of lime, and argil, with generally some oxyd of iron; soft, opake, of a common form, internally earthy, light and miscible with common water by agitation; found in stratified mountains; partly soluble in nitric acid, with effervescence; hardening in the fire and vitrifying in a strong heat. Seven species.

1. M. terrea. Calcareous marl. Earthy marl. Friable, meagre, a little rough to the touch. Four varieties.

α. Argillaceous, lubricous, friable, elastic.
β. Argillaceous, compact, dry, pure with fine particles.
γ. Cretaceous, soiling the fingers.
δ. Arenaceous, crumbling to powder in the air, a little greasy.

Found in almost every country in Europe in strata; colour whitish, yellowish-white or yellowish-grey; grows paler in drying: sometimes found mixed with mica, gypsum or sand, and in the latter case is fusible into a transparent glass: spec. grav. from 1,600 to 2,400.

2. M. Nilotica. Egyptian marl. Farinaceous, brownish, cinereous when burnt, mixed with mould. Found in the plains of Egypt usually overflowed by the waters of the Nile, where it is left by deposition after their recess, and is highly fertile.

There is a vitrifying variety found at Upland in Sweden.

3. M. fatiscens. Marly schistus. Very soft, fissile, greyish, crumbling to powder in the air. Found in thicker or thinner strata in Sweden, Germany, and Switzerland, often between calcareous strata: colour yellowish, greenish, blueish, with often a rufous tinge.

4. M. porosa. Mimic tophus, or tufa: solid tufa: argillaceous tufa. Indurated, porous, precipitated from waters, breaking into indeterminate fragments. Found in various parts of Britain, Sweden and Germany, at the bottom of waters, particularly those that are stagnant, and becomes reddish when burnt, in proportion to the oxyd of iron it contains; sometimes whitish or grey.

5. M. schistosa. Marl schistus: indurated calcareous marl. Indurated, not crumbling in the air, greyish, of a slaty texture, breaking into discoid fragments. There is a variety that is slaty, crude and green; called in Syst. Nat.

schistus viridis, green schistus. Found stratified in various parts of Europe, with frequently particles of mica interspersed, and sometimes the oxyds of metals and fossils.

6. M. bituminosa. Bituminous marl: bituminous marlite: bituminous marl schistus. Schistous copper: corrosive copper. Found in stratified mountains of various parts of Germany, frequently containing the impressions of fishes and marine plants, and often the ores and oxyds of copper; colour greyish, blueish or blackish; the thin plates a little sonorous: spec. gravity from 2,361 to 2,442.

7. M. anonyma. Pyritaceous limestone.—Shining within, hardish, of a dull iron colour. Found near St. Ambroix in France, sometimes so hard as to admit a polish, and strike fire with steel: besides a little schistose earth, sulphur and quartz, it contains iron, argil and carbonat of lime.

MARGARET (St.), a celebrated virgin, who, as is supposed, received the crown of martyrdom at Antioch in the year 275: the manner of her death is not known. The ancient martyrologists make no mention of her name, and she did not become famous till the 11th century. There is no more foundation for what is said concerning her relics and girdles than for the stories which are told of her life. A festival, however, is still held in honour of her memory on the 20th of July. See Baillet's Lives of the Saints, for that day. "Her actions (says this author) have been so falsified and altered, in the opinion even of Metaphrastus, that the Romish church have not thought proper to insert any of them into their breviary." The Orientals pay reverence to her by the name of Saint Pelagia or Saint Marina, and the western church by that of Saint Gerama or Saint Margaret.

MARGARET of Anjou, queen of England, daughter of René of Anjou, king of Sicily, and wife of Henry VI. Henry duke of Gloucester having opposed this marriage, Margaret spared no pains to ruin that virtuous prince, which she at length accomplished, and he was strangled in prison. In the civil wars that broke out between the houses of Lancaster and York, she displayed an amazonian spirit, and having mustered an army, defeated the duke of York at Wakefield. In her march to London she encountered the earl of Warwick at St. Alban's, who had her husband with him as a prisoner. Margaret immediately attacked him, routed his forces, and set her husband at liberty. But afterwards she was defeated at Tawton, and finding no probability of getting a new army in England, she crossed over to France with her son Edward, to solicit succours from Louis XI. who refused them. She returned again to England. After various hardships, she was made prisoner in 1471, but in 1475 was ransomed by Louis, in return for which she made over to him all her right to the duchies of Anjou, Lorraine, and Bar, and the county of Provence. She died in the parish of Dampierre near Saumur in 1482.

MARGARET, countess of Richmond and Derby, was born at Bletsoe in Bedfordshire in 1441. She married Edmund earl of Richmond, by whom she had an only son, who was afterwards Henry VII. She became a widow in 1546, and afterwards married sir Henry Stafford, on whose death she united herself in marriage to Thomas lord Stanley, who was created earl of Derby in 1485. This noble lord died in 1504. Her ladyship was a great patroness of learning, and learned men, and founded two colleges at Cambridge, Christ's and St. John's. She published a work entitled, The Mirroure of Golde for the sinfull Soule, translated from the French; also the fourth book of Gerson's or Kempis's treatise of the Imitation and following the blessed Life of our Saviour Christ, printed in 1504. She died in 1509.

MARGARET of Valois, queen of Navarre, and sister to Francis I. king of France, was born in 1492, and was daughter of Charles of Orleans, duke of Angoulême. In 1509 she married Charles the last duke of Alençon, who died in 1525. Her next husband was Henry d'Albert king of Navarre, by whom she had Joan d'Albert, mother of Henry IV. Margaret sustained the character of queen in the most exemplary manner, and died in 1549, having embraced the protestant religion. She wrote, 1. Heptameron, or Novels of the Queen of Navarre, printed in quarto, 1560, and several times since. 2. Les Marguerites de la Marguerite des Princesses, which is a miscellany of her productions, consisting of prose and verse.

MARGARETTA, an island near Terra Firma, 40 miles long and 15 broad, discovered by Columbus in 1498. The continual verdure renders it pleasant; but it is not considerable since the Spaniards retired thence to Terra Firma. The present inhabitants are mulattos, and the original natives. It was taken in 1626 by the Dutch, who demolished the castle. Lon. 63. 12 E. Lat. 10. 46 N.

MARGARITA, in natural history. See PEARL and MYA.

MARGARITA. (*margarita*, μαργαριτης, from *margalith*, Rab.) Perla. Unio. The pearl. A small calcareous concretion, of a bright transparent whiteness, found on the inside of the shell concha margaritifera of Linnéus, or mother-of-pearl fish. Pearls were formerly exhibited as antacids in medicine.

MARGARITA, in surgery, a tumour upon the eye resembling a pearl.

MARGARITANIA, in botany, a genus of the class diœcia, order octandria. Calyx four-toothed; petals four. Fem. Styles four or five; very cartilaginous, four or five grained. One species; a native of Surinam.

MARGATE, a seaport town of England, in the county of Kent, situated on the north coast of the isle of Thanet, within a small bay, in the breach of the cliff, where is a gate to the sea, whence its name. In all matters of civil jurisdiction, Margate is subject to the mayor of Dover, whose deputy resides here, and of which town and port it is a member. The principal street is near a mile in length, and built on an easy ascent, by which means the upper part is

clean and dry, and the lower end much more so than formerly; a considerable sum of money having been lately expended in drains for that purpose. The harbour is pleasant, but not greatly frequented, for want of a sufficient depth of water to keep vessels of burden afloat; nevertheless great quantities of corn, and all kinds of grain, are shipped here for London. The pier of wood carried out to the eastward, in a circular form, for the security of shipping, is built where nature, by a cove in the cliff, seemed to direct, and is very ancient. Margate has great conveniency for bathing; the shore being level and covered with fine sand, is extremely well adapted for that purpose. On the wharf are several bathing rooms which are large and convenient. Hither the company resort to drink the water, and from thence, in turn, they enter the machines, which are driven out into the sea, often to the distance of two or three hundred yards, under the conduct of careful guides. Since Margate has been so much frequented by persons of consequence, many considerable additions and improvements have been made to the town. A large square has been lately erected, in which are some very handsome houses, built by persons of fortune for their own use, with several others intended for the reception of the company. Margate is now as well supplied with shops as most other public places, and there are many very reputable tradesmen, in all branches of business. The various articles of trade are mostly furnished by a ready and quick communication with London, by the hoys. They are sloops of 80 or 100 tons burden, of which there are five, and sail alternately. The passage is often made in eight or ten hours, and at other times in two or three days, as the wind and tide happen to suit. The best wind down is W.N.W. and the best up E.S.E. 25 miles N. of Dover, and 72 E. of London. Lon. 1. 28 E. Lat. 51. 24 N.

MARGE. MA'RGENT. MA'RGIN. *s.* (*margo*, Latin; *marge*, French.) 1. The border; the brink; the edge; the verge (*Spenser*). 2. The edge of a page left blank (*Hammond*). 3. The edge of a wound or sore (*Sharp*).

MA'RGINAL. *a.* (*marginal*, French.) Placed or written on the margin (*Watts*).

MA'RGINATED. *a.* (*marginatus*, Latin.) Having a margin.

MARGON (William de), a French writer, was a native of Languedoc, and defended the jesuits against the jansenists with so much acrimony, that the court banished him. In 1746 he obtained his recal, on condition of going into a monastery, where he died in 1760. He assisted in writing the Memoirs of Marshal Villars, Memoirs of the Duke of Berwick, and other works.

MARGODES, in mineralogy. See MARMOR.

MARGRAVE. See MARCGRAVE.

MARHATTAS. See MAHRATTAS.

MARIA (St.), an island in the Indian Ocean, five miles E. of Madagascar. It is 27 miles long and five broad, well watered, and surrounded by rocks. The air is extremely moist, for it rains almost every day. It is inhabited by about 600 negroes, but seldom visited by ships passing that way.

MARIA (St.), the most southern island of the Azores, which produces plenty of wheat, and has about 5000 inhabitants.

MARIA (St.), a considerable town of Spain, in Andalusia, with a small castle. It was taken by the English and Dutch in 1702; and is seated on the Guadaleta, at the mouth of which is a tower and a battery, 18 miles N. of Cadiz. Lon. 6. 6 W. Lat. 36. 39 N.

MARIA (St.), a considerable town of Terra Firma Proper, in the audience of Panama, built by the Spaniards after they had discovered the gold mines that are near it, and soon after taken by the English. It is seated at the bottom of the gulf of St. Michael, at the mouth of a river of the same name. Lon. 78. 12 W. Lat. 7. 43 N.

MARIAMNE, the wife of Herod the Great, by whom she had two sons, Alexander and Aristobulus, and two daughters. Herod was very fond of Mariamne, but she had little regard for him, especially after his putting to death her brother Aristobulus. When Herod went to Rome to court the favour of Augustus, he left secret orders with Josephus and Sohemus, to make away both with her and her mother in case that any misfortune should happen to him. Mariamne having got this secret out of Sohemus, upbraided Herod at his return with his inhumanity, for which he put both her and Sohemus to death.

MARIAN ISLANDS. See LADRONES.

MARIANA (John), a Spanish historian, was born at Talavera in Castile in 1537, and entered among the jesuits at the age of 17. He distinguished himself by a famous book, entituled, De Rege et Regis Institutione, in which he justified the assassination of heretical princes. This piece was burnt at Paris by order of parliament, and brought upon his order much odium. His greatest work is, The History of Spain, written first in Latin, but afterwards in Spanish, and universally known. The author brought it down to 1621, but it has been since continued by others. He was the author of several other books, and died at Toledo in 1624.

MARIBONE, or St. MARY LE BONE, or rather BORNE, from the neighbouring brook, a parish of Middlesex, on the north-west side of London. The manor appears to have belonged anciently to the bishop of London. The houses in this parish are very numerous, comprising several extensive streets and squares, which are every year increasing. The Paddington road from Islington passes through this parish, which gives it communication with the eastern part of London without passing through the streets. Here were three conduits erected about the year 1238, for supplying the city of London with water; but, anno 1703, when it was plentifully served by the New River, the citizens let them out at 700l. a year for 43 years. There were two for receiving its water at the north-east corner of the bridge on the river

Tyburn, and over them stood the lord mayor's banqueting-house, to which (the use of coaches being not then known) his lordship and the aldermen used to ride on horseback, as their ladies did in waggons. This banqueting-house, after being many years neglected, was taken down in 1737, and the cisterns arched over.—This village, if it may be called by that name, is joined by new buildings to London. The old church, which was a mean edifice, was pulled down, and a new one erected in 1741. Besides which it has a great number of chapels of every sect and persuasion, and an extensive work-house for the poor.

MA'RICA, in botany, a genus of the class triandria, order monogynia. Corol one-petalled, six-parted, the segments alternately smaller and larger; stigma petal-form, trifid; the segments simple, acute; capsule three-celled, inferior. One species: a bulbous-rooted plant of Guiana, with grass leaves; and white or blue feathers.

MARIDUNUM, the name by which the Romans called Caermarthen.

MARIE-AUX-MINES, a town of France, in the department of the Vosges, divided into two parts by the river Leber. It is famous for its silver mines, and 25 miles N.W. of New Brisach. Lon. 7. 24 E. Lat. 48. 16 N.

MARIENBURG, a town of Upper Saxony, in Misnia, remarkable for its rich silver mines. It is seated among the mountains, on the confines of Bohemia, 28 miles S.S.W. of Dresden. Lon. 13. 35 E. Lat. 50. 49 N.

Marienburg, an ancient and strong town of Western Prussia, capital of a palatinate of the same name, with a castle. It is seated on a branch of the Vistula, 30 miles S.W. of Elbing, and 30 S.E. of Dantzic. Lon. 19. 15 E. Lat. 54. 9 N.

Marienburg, a town of France, in the department of the North, formerly a strong place, but dismantled by the French, after it was ceded to them by the treaty of the Pyrenees. It is 10 miles S.W. of Charlemont. Lon. 4. 28 E. Lat. 50. 2 N.

MARIENSTADT, a town of Sweden, in W. Gothland, seated on the lake Wenner, 35 miles S.E. of Carlstadt, and 162 S.W. of Stockholm. Lon. 14. 25 E. Lat. 58. 28 N.

MARIENWERDER, a town of Western Prussia, with a castle. The cathedral is the largest church in the kingdom of Prussia, being 320 feet long; and by its strong breast-works seems to have formerly served as a fortress. The palace here is spacious, and built in the old Gothic taste. Marienwerder is seated on the Vistula, 20 miles S.S.W. of Marienburg. Lon. 19. 5 E. Lat. 53. 49 N.

MARIEGALANTE, one of the Leeward Caribbee Islands, subject to the French. It extends 16 miles from N. to S. and four from E. to W.; and along the E. shore are lofty perpendicular rocks, that shelter vast numbers of tropical birds. It is full of hills, and has several large caverns, with many little streams and ponds of fresh water. It is covered with trees, and particularly abounds with tobacco and the wild cinnamon tree. It is 30 miles N. of Dominica, and 40 E. of Guadaloupe. Lon. 61. 11 W. Lat. 15. 52 N.

MARIGOLD, in botany. See Calendula.

Marigold (African). See Tagetes.

Marigold (Corn). See Chrysanthemum.

Marigold (Fig). See Mesembryanthemum.

Marigold (French). See Tagetes.

Marigold (Common Sweet).
Marigold (Pot).
Marigold (Wild).
Marigold (Winter).
See Origanum.

MARILA, in botany, a genus of the class polyandria, order monogynia. Calyx five-leaved; petals five; stigma simple; capsule four-celled, many-seeded. One species; a native of the West Indies.

*To* MA'RINATE. *v. a.* (*mariner*, French.) To salt fish, and then preserve them in oil or vinegar (*King*).

MARI'NE. *a.* (*marinus*, Latin.) Belonging to the sea (*Woodward*).

Marine, a general name for the navy of a kingdom or state; as also the whole economy of naval affairs; or whatever respects the building, rigging, arming, equipping, navigating, and fighting ships. It comprehends also the government of naval armaments, and the state of all the persons employed therein, whether civil or military. The history of the marine affairs of any one state is a very comprehensive subject, much more that of all nations. Those who would be informed of the maritime affairs of Great Britain, and the figure it has made at sea in all ages, may find abundance of curious matter in Selden's Mare Clausum; and from his time to ours we may trace a series of facts in Lediard's and Burchet's Naval History, but above all in the Lives of the Admirals, by the accurate and judicious Dr. Campbell.

Marines, or Marine forces, a body of soldiers raised for the sea-service, and trained to fight either in a naval engagement or in an action ashore. The great service of this useful corps was manifested frequently in the course of the war before last, particularly at the siege of Belleisle, where they acquired a great character, although lately raised, and hardly exercised in military discipline. At sea they are incorporated with the ship's crew, of which they make a part; and many of them learn in a short time to be excellent seamen, to which their officers are ordered by the admiralty to encourage them, although no sea officer is to order them to go aloft against their inclination. In a sea-fight their small arms are of very great advantage in scouring the decks of the enemy; and when they have been long enough at sea to stand firm when the ship rocks, they must be infinitely preferable to seamen if the enemy attempts to board, by raising a battalion with their fixed bayonets to oppose them.

The sole direction of the corps of marines is vested in the lords commissioners of the admiralty; and in the admiralty is a distinct apart-

ment for this purpose. The secretary to the admiralty is likewise secretary to the marines, for which he has a salary of 300l. a year; and he has under him several clerks for the management of this department. The number of marines in the British service at this time is between 30 and 40,000.

MARINE ACID. See ACID and MURIATIC.

MARINE CHAIR, a machine invented by Mr. Irwin for viewing the satellites of Jupiter at sea, and of course determining the longitude by their eclipses. An account of it is given in the Journal Estranger for March 1760. An account of its accuracy was published the year following by M. de l'Isle, astronomer in the imperial academy of Petersburg; but notwithstanding the encomiums bestowed upon it by this gentleman, it has never come into general use; and therefore we may conclude, that it is much inferior to the inventions of Mr. Harrison for the same purpose.

MARINE SURVEYOR, is the name of a machine contrived by Mr. H. de Saumarez for measuring the way of a ship in the sea. This machine is in the form of the letter Y, and is made of iron or any other metal. At each end of the lines which constitute the angle or upper part of that letter are two pallets, not much unlike the figure of the log; one of which falls in the same proportion as the other rises. The falling or pendent pallet meeting a resistance from the water, as the ship moves, has by that means a circular motion under water, which is faster or slower according as the vessel moves. This motion is communicated to a dial within the ship, by means of a rope fastened to the tail of the Y, and carried to the dial. The motion being thus communicated to the dial, which has a bell in it, it strikes exactly the number of geometrical paces, miles, or leagues which the ship has run. Thus the ship's distance is attained, and the forces of tides and currents may also be discovered by this instrument: which, however, has been very little used.

MARINE SALT. Sal commune. Sal culinaris. Sal fontium. Sal gemmæ. Sal marinus. Sal fossile. Murias sodæ. New Ch. Nom. Common culinary salt. This salt is more abundant in nature than any other. It is found in prodigious masses in the internal parts of the earth, in Calabria, in Hungary, in Moscovy, and more especially Weilieska, in Poland, near Mount Capax, where the mines are very large, and afford immense quantities of salt. It is also obtained by several artificial means from sea-water. See MURIDAS SODÆ.

MA'RINER. *s.* (from *mare*, Latin.) A seaman; a sailor (*Swift*).

MARINER'S COMPASS. See COMPASS.

MARINO (St.), a town of Italy, in Campagna di Roma, with a castle, 10 miles E. of Rome. Lon. 12. 46 E. Lat. 41. 54 N.

MARINO (John Baptist), a celebrated Italian poet; born at Naples in 1569. His father, who was an able civilian, obliged him to study the law; at which being disgusted, he left his parents, and retired to the house of the Sieur Manzi, who was a friend to all persons of wit. He at length became secretary to Mathew of Capua, great admiral of the kingdom of Naples, and contracted a friendship with Tasso. A short time after he went to Rome, and entered into the service of cardinal Aldobrandini, nephew to pope Clement VIII. who took him with him to Savoy. Marino was in great favour with the court of Turin; but afterwards created himself many enemies there, the most furious of whom was the poet Gaspard Murtola, who, attempting to shoot him with a pistol, wounded one of the duke of Savoy's favourites. Marino being obliged to leave Turin, went to Paris at the desire of queen Mary de Medicis, and published there his poem on Adonis. He afterwards went to Rome, where he was made prince of the academy of the humoristi; from thence to Naples, where he died while he was preparing to return home. He had a very lively imagination, but little judgment; and, giving way to the points and conceits then in vogue, his authority, far from correcting the false taste of the Italians, served rather to keep it farther from reformation. His works, which are numerous, have been often printed.

MARIONIS, the Roman name for Hamburg.

MARIOTTE (Edme), an eminent French philosopher and mathematician, was born at Dijon, and admitted a member of the Academy of Sciences of Paris in 1666. His works however are better known than his life. He was a good mathematician, and the first French philosopher who applied much to experimental physics. The law of the shock or collision of bodies, the theory of the pressure and motion of fluids, the nature of vision, and of the air, particularly engaged his attention. He carried into his philosophical researches that spirit of scrutiny and investigation so necessary to those who would make any considerable progress in it. He died in 1684.

He communicated a number of curious and valuable papers to the Academy of Sciences, which were printed in the collection of their Memoirs dated 1666, viz. from volume 1 to volume 10. And all his works were collected into two volumes quarto, and printed at Leyden in 1717.

MARJORAM, in botany. See ORIGANUM.

MA'RISH. *s.* (*marais*, French.) A bog; a fen; a swamp; watery ground (*Sandys*).

MA'RISH. *a.* Moorish; fenny; boggy; swampy (*Bacon*).

MARITAGIUM, in the feudal customs (as contradistinguished from *matrimonium*) denoted the power which the lord or guardian in chivalry had of disposing of his infant ward in matrimony.

MA'RITAL. *a.* (*maritus*, Latin.) Pertaining to a husband (*Ayliffe*).

MA'RITATED. *a.* (from *maritus*, Latin.) Having a husband.

MARI'TIMAL. MA'RITIME. *a.* (*maritimus*, Latin; *maritime*, French.) 1. Performed on the sea; marine (*Raleigh*). 2. Relating

to the sea; naval (*Wotton*). 3. Bordering on the sea (*Milton*).

MARIUS (C.), a celebrated Roman, who, from a peasant, became one of the most powerful and cruel tyrants during the consular government. He was born at Arpinum, of obscure parents. He forsook the plough for the camp, and signalized himself under Scipio at the siege of Numantia. By his intrigues at Rome, while he exercised the inferior offices of the state, he rendered himself known. He passed into Africa as lieutenant to the consul Metellus against Jugurtha, and, after he had there ingratiated himself with the soldiers, he returned to Rome, and canvassed for the consulship. He was elected, and appointed to finish the war against Jugurtha, who was defeated, and afterwards betrayed into the hands of the Romans by Bocchus. No sooner was Jugurtha conquered, than the provinces of Rome were suddenly invaded by an army of 300,000 barbarians, and Marius was again elected consul, and sent against the Teutones. The war was prolonged, and Marius was a third and fourth time invested with the consulship. At last two engagements were fought, and not less than 200,000 of the barbarian forces of the Ambrones and Teutones were slain in the field of battle, and 90,000 made prisoners. The following year a total overthrow of the Cimbri took place, in which 140,000 were slaughtered by the Romans, and 60,000 taken prisoners. Marius, with his colleague Catullus, then entered Rome in triumph He was elected consul a sixth time, when they began to raise seditions, and to oppose the power of Sylla. This was the cause and the foundation of a civil war Sylla, who was prosecuting the Mithridatic war, and who had refused to deliver up the command of the army, advanced to Rome, and Marius was obliged to save his life by flight. He endeavoured to effect his escape to Africa, but was, in consequence of the wind not proving favourable, obliged to take shelter in a marsh on the coasts of Campania. Here he was discovered, and violently dragged to Minturnæ. Sylla passed sentence of immediate death on him. A Gaul was commanded to cut off his head, but the stern countenance of Marius disarmed the courage of the executioner, and, when he heard the exclamation of *Tune, homo, audes occidere Caium Marium*, the dagger dropt from his hand. Such an uncommon adventure moved the compassion of the inhabitants. They released Marius, and favoured hise scape to Africa, where he resided for some time. Having soon after learned that Cinna had embraced his cause at Rome, he set sail to assist his friend, only at the head of a thousand men. His army, however, was soon increased, and he entered Rome like a conquerer. His enemies were inhumanly sacrificed to his fury, and Rome was filled with blood. When Marius and Cinna had sufficiently gratified their resentment, they made themselves consuls; but Marius, already worn out with old age and infirmities, died in the 70th year of his age, sixteen days after he had been honoured with the consular dignity for the seventh time, B. C. 86. Such was the end of Marius, who rendered himself conspicuous by his victories, and by his cruelty.—2. Caius, the son of the great Marius, was as cruel as his father, and shared his good and his adverse fortune.—3. M. Aurelius, a native of Gaul, who, from the mean employment of a blacksmith, became one of the generals of Gallienus, and at last caused himself to be saluted emperor. Three days after this elevation, a man who had shared his poverty without partaking of his more prosperous fortune publicly assassinated him.—4. Maximus, a Latin writer, who published an account of the Roman emperors from Trajan to Alexander, now lost.

MARIVAUX (Peter Carlet de), a French writer in the dramatic way and in romance, was born of a good family at Paris in 1688. A fine understanding, well improved by education, distinguished him early. His first object was the theatre, where he met with the highest success in comic productions; and these, with the merit of his other works, procured him a place in the French academy. The great characteristic of both his comedies and romance was, to convey an useful moral under the veil of wit and sentiment: "My only object (says he) is to make men more just and more humane;" and he was as amiable in his life and conversation as he was in his writings. He died at Paris in 1763, aged 75. His works consist of, 1. Pieces de Theatre, 4 vols. 12mo. 2. Homere travesti, 12mo.; which is not supposed to have done much honour to his taste. 3. Le Spectateur François, 2 vols. 12mo.. 4. Le Philosophe Indigent, 12mo. 5. Vie de Marianne, 2 vols. 12mo; one of the best romances in the French language. 6. Le Paysan Parvenu, 12mo. 7. Pharsamon; inferior to the former.

MARK (St.), was by birth a Jew, and descended of the tribe of Levi. He was converted by some of the apostles, probably by St. Peter; to whom he was a constant companion in all his travels, supplying the place of an amanuensis and interpreter. He was by St. Peter sent into Egypt, fixing his chief residence at Alexandria, and the places thereabout: where he was so successful in his ministry, that he converted multitudes both of men and women. He afterwards removed westward, towards the parts of Libya, going through the countries of Marmorica, Pentapolis, and others thereabouts; where, notwithstanding the barbarity and idolatry of the inhabitants, he planted the gospel. Upon his return to Alexandria, he ordered the affairs of that church, and there suffered martyrdom in the following manner: about Easter, at the time the solemnities of Serapis were celebrated, the idolatrous people, being excited to vindicate the honour of their deity, broke in upon St. Mark, while he was performing divine service, and, binding him with cords, dragged him through the streets, and thrust him into prison, where in the night he had the comfort of a divine vision. Next day the enraged multitude used him in the same manner, till, his spirits failing, he ex-

pired under their hand. Some add, that they burnt his body, and that the Christians decently interred his bones and and ashes near the place where he used to preach. This happened in the year of Christ 68. Some writers assert, that the remains of St. Mark were afterwards, with great pomp, translated from Alexandria to Venice. However, he is the tutelar saint and patron of that republic, and has a very rich and stately church erected to his memory. This apostle is author of one of the four gospels inscribed with his name. See the following article.

MARK'S GOSPEL (St.), a canonical book of the New Testament, being one of the four gospels. St. Mark wrote his gospel at Rome, where he accompanied St. Peter, in the year of Christ 64 or 65. Many of the most ancient writers assert, that St. Mark was no more than an amanuensis or interpreter to St. Peter, who dictated this gospel to him; others affirm that he wrote it after St. Peter's death. It is probable that it was not composed long before Peter's death, and that it was not published, or did not become generally known, till after the death of Peter and Paul. This gospel appears, from the accounts given of it by the ancients, to contain the substance of Peter's preaching: and the gospel itself affords evidences of its being writ according to that apostle's discourses, or according to information and directions given by him to this evangelist. Many circumstances tending to Peter's honour are not mentioned in this gospel: however there are many things that occur in this gospel, which are omitted by the other evangelists; and this fact proves, that Mark was not an epitomiser of Matthew, as some have supposed, nor of any other author. The learned have been also divided as to the language this gospel was wrote in, some affirming it was composed in Greek, which is the more general and probable opinion, others in Latin. Several of the ancient heretics received only the gospel of St. Mark: others, among the Catholics, rejected the twelve last verses of this gospel. But Dr. Lardner refers those who doubt the genuineness of this part of the gospel, for satisfaction to Dr. Mill, and to the observations of Grotius, at the beginning of that chapter, and to Beza upon the ninth verse; and for explaining those twelve verses, and reconciling them with the other evangelists, he refers to Grotius and other commentators. Lardner's Cred. vol. xv. p. 209.

MARK THE EVANGELIST'S DAY (St.), a festival observed by some Christians on the 25th of April.

MARK. *s.* (*marc*, Welsh; *mercke*, Dutch.) 1. A token by which any thing is known (*Spenser*). 2. A stamp; an impression (*Addison*). 3. A proof; an evidence (*Arbuthnot*). 4. Notice taken (*Shakspeare*). 5. Conveniency of notice (*Carew*). 6. Any thing at which a missile weapon is directed (*Davies*). 7. The evidence of a horse's age (*Bacon*). 8. (*marque*, French.) Licence of reprisals. 9. (*marc*, Fr.) A sum of thirteen shillings and fourpence (*Camden*). 10. A character made by those who cannot write their names (*Dryden*).

*To* MARK. *v. a.* (*merken*, Dutch; *mearcan*, Saxon.) 1. To impress with a token, or evidence (*Shakspeare*). 2. To notify as by a mark (*Decay of Piety*). 3. To note; to take notice of (*Romans*). 4. To heed; to regard as valid (*Smith*).

*To* MARK. *v. n.* To note; to take notice (*Dryden*).

MARK! a term used by sportsmen, particularly in covert shooting, where they are necessarily separated from each other; when one of the party having sprung a pheasant, or flushed a cock, (at which he either did not get a shot, or missed his aim) vociferates the signal, *mark!* in a hope his companion may get a shot, or mark the spot near where he alights, to insure a better chanse of his recovery. It is also used in partridge shooting, where hedges or hedge-rows interrupt the sight, or divide the parties.

MARK. In stable language a horse marks, when he shews his age by a black spot, like the bud or eye of a bean, which appears, at about five and a half, in the cavity of the corner-teeth, and is gone when he is eight years old: then he ceases to mark, and they say he has rased. See the articles AGE, TEETH, and RASE.

Gibson says, "with regard to the marks of horses, arising from their colour, some have reckoned them to be lucky or unlucky, as they happened to be this or that way marked.—Others have even been so curious as to lay much stress upon them, and to denote all the good or ill qualities of a horse from his marks: but however this may be, certain it is, that a horse always looks the more beautiful for being well-marked; and a horse without marks always has a deadness in his aspect.

"A star is the most common of all marks, and where that is wanting, it is often supplied with an artificial one. When the white descends pretty broad toward the nose, it is called a blaze; when it descends into a smaller line, it is called a snip; and when most of a horse's face is white, he is then said to be bald. All these marks are beautiful when they are not in extremes, for a very large star is not reckoned so beautiful as one that is of a moderate size; neither is that baldness that spreads over a horse's whole face and cheeks any way becoming, as it gives him the look of an ox; and such horses are often plain-headed. When the white of a horse's face is divided in the middle, or in any other part, or when a blaze or snip runs awry to one side, it looks somewhat disagreeable, though perhaps it may be no diminution to a horse's goodness. Some black horses have their stars or blazes fringed round with a mixture of black hairs, which looks very well, only such horses are apt soon to grow grey-faced, and look old; as are some of the browns. But when the bays and sorrels have their stars or blazes fringed, it is generally with their own colour, or lighter, and seldom has that effect.

"As to the white marks upon the feet and legs of horses, they usually correspond with the marks upon their faces. Bald horses have generally a good deal of white about their legs, and often all four are white, which in them is not unbecoming. Horses with large blazes have often all their four feet white also; but a horse that has no marks on his face, or but a small one, never looks well with white legs, especially when the white rises above the fetlock: on the other hand, a bald horse, or any that has a blaze, without any of the feet white, is but ill marked; and therefore a horse always looks best when there is this correspondence and agreement in the marks: a horse that has his near-feet both before and behind white, and his off-feet without any white, is but indifferently marked. The same where the marks are only on the off-feet, without any white on the near-feet.

"Some dislike horses for being traversed, or cross-marked, viz. the near-foot before, and the off-foot behind, white; or on the contrary, when the off-foot before, and the near-foot behind, are only white. Those are usually judged to be the best marked that have only the near-foot behind white, or both feet behind white; or where the near-foot before, and both the hind-feet, are white; especially when at the same time a horse has a large radiated star, or small blaze, on his face. When the white about the feet is indented with black, or any other colour, towards the coronet, these feet are thought to be generally good; and when the coronet is spotted like ermine, the mark is so much the better: but where a horse's pasterns, hoofs, and all his four legs, are white, especially when the white rises above the knees or hocks, it looks ugly; and a horse thus marked has too much of the pye-bald, consequently seldom fit for a gentleman's use.

"The feather is another sort of distinction, which we often observe, especially on stone-horses; and such geldings as have short hair, and are finely coated. Some are of a round figure, and some long and narrow, in the true penniform shape, or like an ear of barley. The round are often on the forehead, sometimes on the breast and shoulders, and look like embroidery. Those on the neck lie immediately under the mane, and run down towards the withers. When the feather happens on both sides the neck, the mark is reckoned exceedingly good and beautiful. Sometimes feathers run down the fore-arms, and sometimes on the thigh, and towards the dock; and they may be observed on several other parts of a horse; but, wherever they happen to be, they are almost always reckoned signs of goodness; and some of them are exceedingly beautiful." See the article FEATHER.

MARK (St.), a sea-port on the W. side of St. Domingo. The houses are built of free-stone, which is abundant in the neighbouring country. It was taken by the English and royalists in 1794, and is 45 miles N.N.W. of Port-au-Prince. Lon. 72. 40 W. Lat. 19. 20 N.

MA'RKER. *s.* (from *mark.*) 1. One that puts a mark on any thing. 2. One that notes, or takes notes.

MA'RKET. *s.* (anciently written *mercat*, of *mercatus*, Latin.) 1. A public time, and appointed place, of buying and selling (*Spenser*). 2. Purchase and sale (*Temple*). 3. Rate; price (*marché*, French.) (*Dryden*).

*To* MA'RKET. *v. n.* To deal at a market; to buy or sell; to make bargains.

MA'RKET (Court of the Clerk of the), is incident to every fair and market in the kingdom, to punish misdemeanors therein; and a court of *pie poudre* is to determine all disputes relating to private or civil property. The object of this jurisdiction (see stat. 17. Car. II. cap. 19. 22 Car. II. cap. 8. 23 Car. II. cap. 12.) is principally the cognizance of weights and measures, to try whether they be according to the true standard thereof or no: which standard was anciently committed to the custody of the bishop, who appointed some clerk under him to inspect the abuse of them more narrowly; and hence this officer, though now usually a layman, is called the clerk of the market. If they be not according to the standard, then, beside the punishment of the party by fine, the weights and measures themselves ought to be burnt. This is the lowest court of criminal jurisdiction in the kingdom.

MA'RKET-BELL. *s.* The bell to give notice that trade may begin in the market (*Shak*).

MA'RKET-CROSS. *s.* A cross set up where the market is held (*Shakspeare*).

MA'RKET-DAY. *s.* The day on which things are publicly bought and sold (*Addison*).

MA'RKET-FOLKS. *s.* People that come to the market (*Shakspeare*).

MA'RKET-MAN. *s.* One who goes to the market to sell or buy (*Swift*).

MA'RKET-PLACE. *s.* Place where the market is held (*Sidney*).

MA'RKET-PRICE. MA'RKET-RATE. *s.* The price at which any thing is currently sold (*Locke*).

MA'RKET-TOWN. *s.* A town that has the privilege of a stated market; not a village (*Gay*).

MA'RKETABLE. *a.* (from *market.*) 1. Such as may be sold; such for which a buyer may be found (*Shakspeare*). 2. Current in the market (*Decay of Piety*).

MA'RKET RASEN. See RASEN.

MARKHAM (Gervase), an English author, was the son of Robert Markham, of Gotham, Esq. in Nottinghamshire, and bore a captain's commission under Charles I. in the civil wars. He was esteemed both a good soldier and a good scholar. He was particularly master of the French, Italian, and Spanish. He wrote, 1. The tragedy of Herod and Antipater, which was printed in 1622. 2. Many volumes upon husbandry and horsemanship. 3. A piece on the art of fowling. 4. The soldier's accidence and grammar.

MARKLAND (Jeremiah), one of the most learned scholars and penetrating critics of his

age, was born in 1692, and received his education in Christ's hospital. He became first publicly known by his Epistola Critica, addressed to bishop Hare. In this he gave many proofs of extensive erudition and critical sagacity. He afterwards published an edition of Statius, and some plays of Euripides; and assisted Dr. Taylor in his editions of Lysias and Demosthenes, by the notes which he communicated to him. He has also very happily elucidated some passages in the New Testament, which may be found in Mr. Bowyer's edition of it; and was author of a very valuable volume of remarks on the epistles of Cicero to Brutus, and of an excellent little treatise under the title of Quæstio Grammatica. He died in 1775, at Milton, near Dorking in Surry; and was a man not more valued for his universal reading than beloved for the excellency of his heart and primitive simplicity of manners.

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MARLE, in agriculture, a kind of calcareous earth, which is often and advantageously employed as a manure. It is found in various parts of Britain, and generally lies at the bottom of low bogs.

Marle is divided by farmers into three species; calcareous, argillaceous, and siliceous or sandy; all of which are composed of chalk and clay, so as to crumble with greater or less facility, on being exposed to the atmosphere. They are of a soft, unctous nature, and dissolve speedily after rain; when dry, they slacken in the same manner as lime, and are at length converted into a very fine powder. Their quality varies according to the soil under which they are deposited: the Norfolk marle is held in the greatest esteem; but the most valuable is that found near the sea, or large rivers.

1. Calcareous marle is, in general, of a yellowish-white or yellowish-grey colour, but in some places of a brown or red cast. It is commonly discovered a few feet beneath the surface of the soil, and on the sides of hills, or on the banks of rivers flowing through calcareous countries. This species of marle is mostly of a loose texture; and, though sometimes moderately coherent, yet it seldom possesses a stony hardness, in which state it is called stone-marle. When it is so thin as to be called paper-marle, it is frequently mixed with shells; on which account it is called shell-marle, and is reputed to be the best sort. It effervesces with acids: when pulverized, it feels dry between the fingers; and, if immersed in water, it readily crumbles to pieces, but does not form a viscid mass.

2. Argillaceous marle is of a grey, brown, or reddish-brown colour; being harder, and more unctuous, than the former species, and adhering to the tongue. It effervesces with aqua fortis, or spirit of salt, but not with vinegar: in water, it dissolves more slowly; and, if it be exposed either to air or moisture, it does not moulder so quickly as the calcareous kind.

3. Siliceous or sandy marle contains a greater proportion of sand than of chalk or clay. This species is of a brownish-grey or lead colour; it is, in general, friable and flaky, but sometimes forms very hard lumps. It effervesces with acids, but neither dissolves in water, nor moulders so speedily as either of the two former kinds. Marle affords an excellent manure for sandy, dry, gravelly, or light lands of any kind; it likewise produces very beneficial effects on mossy and clayey soils; provided a due proportion be applied, and afterwards perfectly dissolved.

The quantity necessary to be used varies according to the nature of the soil; but the utmost caution is requisite; because, if too large a portion be scattered on the land, it cannot be easily removed; and, if too little be employed, the deficiency may be readily supplied. On sandy, gravelly, or light soils, it will be advisable to spread as much as will form a thick coat, in order to bind and stiffen the ground. But, of whatever nature the land may be, the most judicious cultivators recommend such a portion to be laid on it as will form a thin coat over the whole surface.

As marle affords so valuable a manure, it will be useful to point out a few characteristics, by which it may be distinguished from different substances that resemble it. For this purpose, a small mass or lump should be exposed to the air: if genuine, it will, in a short time, by the action of the dews, nitre, &c. crumble into small pieces; and there will likewise appear a hoary or whitish congelation on the side accessible to the rays of the sun.—Another method consists in reducing the marle, when dry, to small particles, which are to be thrown into a coal-fire; where, if it be native or pure, it will crackle in a manner similar to salt. But the most certain criterion is, to break a small piece of dry marle into a glass of pure water; in which, if the substance be of the genuine kind, it will speedily dissolve; forming a soft, almost impalpable paste, and throwing up many bubbles or sparkles to the surface of the water. The experiment may be repeated with vinegar, in which fluid the effervescence will be considerably stronger: in both cases, however, it will be necessary to keep the glass steady, as otherwise, if it be agitated, the intestine motion cannot be distinctly observed.

A good artificial marle may be prepared, by mixing equal quantities of pure clay and lime, in alternate layers, so as to form a heap, which should be exposed to the winter frost: this compound is well calculated for light lands; but, if the soil be strong and heavy, it will be necessary to substitute loam and sand for the clay. Such compositions may be usefully employed, where marle is not easily procured.

MARLE, in mineralogy. A mixture of carbonat of lime and clay, in which the carbonat considerably exceeds the other ingredient, is called marle. Its structure is earthy. Opaque, sometimes in powder. Specific gravity from

1.6 to 2.877. Colour usually grey, often tinged with other colours. Effervesces with acids. Some marles crumble into powder when exposed to the air; others retain their hardness for many years. Marles may be divided into two varieties: 1. Those which contain more silica than alumina. 2. Those which contain more alumina than silica. Mr. Kirwan has called the first of these siliceous, the second argillaceous marles. Attention should be paid to this distinction when marles are used as a manure.

MARLE (Bituminous), is found in different parts of Germany. Colour greyish or brownish-black. Found massive. Shistose. Plates flat or waved. Opaque. Feels soft. Easily broken. Moderately heavy. Effervesces with acids. Burns before the blowpipe, leaving black scoriæ.

MARLBOROUGH, a town of Wiltshire, in England, situated near the source of the Kennet, at the foot of a chalky hill, 75 miles from London. It has its name from its chalky soil, which was formerly called marle. It was a Roman station. In the year 1627, a parliament was held in the castle here, which made those laws called Marlborough statutes. There are still some small remains of its walls and ditch. The town, which is an ancient borough by prescription, sends two members to parliament. It is governed by a mayor, two justices, twelve aldermen, twenty-four burgesses, a town clerk, two bailiffs, twelve serjeants at mace, &c. It consists chiefly of one broad street, with piazzas all along one side of it, two parish churches, and several commodious inns, it being the grand thoroughfare from London to Bath and Bristol. To the south are some relics of a priory, particularly the Gatehouse; and the site of a Roman Castrum, the foundations of which have been discovered there, with Roman coins. The ditch is still in some parts twenty feet wide; and towards the river, without the garden walls, one angle of the Castrum is very visible, with the rampart and ditch entire. The mount at the west end of the town, which was the keep or main-guard of the castle, is converted into a pretty spiral walk; at the top of which is an octagon summer-house. This town has often suffered by fire, particularly in 1690, whereupon the parliament passed an act to prevent its houses from being thatched. —The markets here are Wednesdays and Saturdays; and it has five fairs. Lon. 1. 25 W. Lat. 51. 28 N.

MARLBOROUGH (Fort), an English factory on the W. coast of the island of Sumatra, three miles E. of Bencoolen, and 300 N.W. of Batavia. Lon. 102. 9 E. Lat. 3. 49 N.

MARLI, a village of France, between Versailles and St. Germain, near a forest of the same name. This place is 10 miles N.W. of Paris. It is celebrated for its magnificent palace, and for its curious machine on the Seine, by which the water is raised to supply the palace.

Descriptions of this machine are given in Hutton's translation of Ozanam's Recreations, vol. ii. p. 149; Gregory's Mechanics, vol. ii. p. 244; and Montucla Histoire des Mathematiques, tome iii. p. 745.

MA'RLINE. *s.* (meaŋn, *Skinner.*) Long wreaths of untwisted hemp dipped in pitch, with which cables are guarded (*Dryden*).

MA'RLINESPIKE. *s.* a small piece of iron for fastening ropes together (*Bailey*).

MA'RLITE (Bituminous). See MARGA.

MARLOW, or GREAT MARLOW, a town of England, in the county of Buckingham, situated on the side of the river Thames, under the Chiltern hills, with a weekly market on Saturday. It is a borough town, and sends two members to the British parliament. The chief manufacture is making lace and paper. The establishment of the junior department of the Royal Military College is now at this place, the senior department being at High Wycombe. Marlow is 17 miles S. of Aylesbury, and 31 W. of London. Lon. 0. 45 W. Lat. 51. 35 N.

MA'RLPIT. *s.* (*marl* and *pit.*) Pit out of which marl is dug (*Woodward*).

MA'RLY. *a.* (from *marl.*) Abounding with marl (*Mortimer*).

MARLY TUFA, in mineralogy. See TOPHUS.

MA'RMALADE. MA'RMALET. *s.* (*marmelade*, French.) The pulp of quinces boiled into a consistence with sugar (*Quincy*).

MA'RMARIDÆ, the inhabitants of that part of Libya which is between Cyrene and Egypt.

MARMOR. Marble. In mineralogy, a genus of the class earths, order calcareous. Consisting of carbonat of lime, carbonic acid gass and water; hardish, meagre to the touch, of a common form, lightish, composing whole mountains, or the greater part of them, or in detached pieces; burning into quick-lime, soluble for the most part in acids with effervescence. Fourteen species:

1. M. hammites. Ketton-stone. Compact limestone. Oolite. Pisolite. Opaque, without lustre, compact, consisting of accreted round granulations. Three other varieties.

β. Oolite: with the globules as large as the spawn of a fish.

γ. Cenchrite: with the globules as large as a millet-seed.

δ. Meconite: with the globules as large as the seeds of a poppy.

Found in stratified mountains in various parts of Britain, in Saxony, Brunswick, France, and Switzerland, always in large masses, with rarely the remains of animal substances: colour various; the granulations easily detached, and in small pieces may be crumbled between the fingers. Bath-stone and Portland-stone are varieties of this species.

2. M. granulare. Crude marble: foliated and granular lime-stone; nearly opake, lamellar, shining internally, hardish, spontaneously falling into granulations, not admitting a polish. Found in vast beds or strata in many mountains of Europe, constituting their principal parts; and never containing the vestiges of living bodies; granulations of different sizes; colour various; fracture foliated; always straight; is used for building, mending roads,

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1. Calcareous marle is, in general, of a yellowish-white or yellowish-grey colour, but in some places of a brown or red cast. It is commonly discovered a few feet beneath the surface of the soil, and on the sides of hills, or on the banks of rivers flowing through calcareous countries. This species of marle is mostly of a loose texture; and, though sometimes moderately coherent, yet it seldom possesses a stony hardness, in which state it is called stone-marle. When it is so thin as to be called paper-marle, it is frequently mixed with shells; on which account it is called shell-marle, and is reputed to be the best sort. It effervesces with acids: when pulverized, it feels dry between the fingers; and, if immersed in water, it readily crumbles to pieces, but does not form a viscid mass.

2. Argillaceous marle is of a grey, brown, or reddish-brown colour; being harder, and more unctuous, than the former species, and adhering to the tongue. It effervesces with aqua fortis, or spirit of salt, but not with vinegar: in water, it dissolves more slowly; and, if it be exposed either to air or moisture, it does not moulder so quickly as the calcareous kind.

3. Siliceous or sandy marle contains a greater proportion of sand than of chalk or clay. This species is of a brownish-grey or lead colour; it is, in general, friable and flaky, but sometimes forms very hard lumps. It effervesces with acids, but neither dissolves in water, nor moulders so speedily as either of the two former kinds. Marle affords an excellent manure for sandy, dry, gravelly, or light lands of any kind; it likewise produces very beneficial effects on mossy and clayey soils; provided a due proportion be applied, and afterwards perfectly dissolved.

The quantity necessary to be used varies according to the nature of the soil; but the utmost caution is requisite; because, if too large a portion be scattered on the land, it cannot be easily removed; and, if too little be employed, the deficiency may be readily supplied. On sandy, gravelly, or light soils, it will be advisable to spread as much as will form a thick coat, in order to bind and stiffen the ground. But, of whatever nature the land may be, the most judicious cultivators recommend such a portion to be laid on it as will form a thin coat over the whole surface.

As marle affords so valuable a manure, it will be useful to point out a few characteristics, by which it may be distinguished from different substances that resemble it. For this purpose, a small mass or lump should be exposed to the air: if genuine, it will, in a short time, by the action of the dews, nitre, &c. crumble into small pieces; and there will likewise appear a hoary or whitish congelation on the side accessible to the rays of the sun.—Another method consists in reducing the marle, when dry, to small particles, which are to be thrown into a coal-fire; where, if it be native or pure, it will crackle in a manner similar to salt. But the most certain criterion is, to break a small piece of dry marle into a glass of pure water; in which, if the substance be of the genuine kind, it will speedily dissolve; forming a soft, almost impalpable paste, and throwing up many bubbles or sparkles to the surface of the water. The experiment may be repeated with vinegar, in which fluid the effervescence will be considerably stronger: in both cases, however, it will be necessary to keep the glass steady, as otherwise, if it be agitated, the intestine motion cannot be distinctly observed.

A good artificial marle may be prepared, by mixing equal quantities of pure clay and lime, in alternate layers, so as to form a heap, which should be exposed to the winter frost: this compound is well calculated for light lands; but, if the soil be strong and heavy, it will be necessary to substitute loam and sand for the clay. Such compositions may be usefully employed, where marle is not easily procured.

Marle, in mineralogy. A mixture of carbonat of lime and clay, in which the carbonat considerably exceeds the other ingredient, is called marle. Its structure is earthy. Opaque, sometimes in powder. Specific gravity from

1.6 to 2.877. Colour usually grey, often tinged with other colours. Effervesces with acids. Some marles crumble into powder when exposed to the air; others retain their hardness for many years. Marles may be divided into two varieties: 1. Those which contain more silica than alumina. 2. Those which contain more alumina than silica. Mr. Kirwan has called the first of these siliceous, the second argillaceous marles. Attention should be paid to this distinction when marles are used as a manure.

Marle (Bituminous), is found in different parts of Germany. Colour greyish or brownish-black. Found massive. Shistose. Plates flat or waved. Opaque. Feels soft. Easily broken. Moderately heavy. Effervesces with acids. Burns before the blowpipe, leaving black scoriæ.

MARLBOROUGH, a town of Wiltshire, in England, situated near the source of the Kennet, at the foot of a chalky hill, 75 miles from London. It has its name from its chalky soil, which was formerly called marle. It was a Roman station. In the year 1627, a parliament was held in the castle here, which made those laws called Marlborough statutes. There are still some small remains of its walls and ditch. The town, which is an ancient borough by prescription, sends two members to parliament. It is governed by a mayor, two justices, twelve aldermen, twenty-four burgesses, a town clerk, two bailiffs, twelve serjeants at mace, &c. It consists chiefly of one broad street, with piazzas all along one side of it, two parish churches, and several commodious inns, it being the grand thoroughfare from London to Bath and Bristol. To the south are some relics of a priory, particularly the Gate-house; and the site of a Roman Castrum, the foundations of which have been discovered there, with Roman coins. The ditch is still in some parts twenty feet wide; and towards the river, without the garden walls, one angle of the Castrum is very visible, with the rampart and ditch entire. The mount at the west end of the town, which was the keep or main-guard of the castle, is converted into a pretty spiral walk; at the top of which is an octagon summer-house. This town has often suffered by fire, particularly in 1690, whereupon the parliament passed an act to prevent its houses from being thatched. —The markets here are Wednesdays and Saturdays; and it has five fairs. Lon. 1. 25 W. Lat. 51. 28 N.

Marlborough (Fort), an English factory on the W. coast of the island of Sumatra, three miles E. of Bencoolen, and 300 N.W. of Batavia. Lon. 102. 9 E. Lat. 3. 49 N.

MARLI, a village of France, between Versailles and St. Germain, near a forest of the same name. This place is 10 miles N.W. of Paris. It is celebrated for its magnificent palace, and for its curious machine on the Seine, by which the water is raised to supply the palace.

Descriptions of this machine are given in Hutton's translation of Ozanam's Recreations, vol. ii. p. 149; Gregory's Mechanics, vol. ii. p. 244; and Montucla Histoire des Mathematiques, tome iii. p. 745.

MA'RLINE. *s.* (mearn, *Skinner.*) Long wreaths of untwisted hemp dipped in pitch, with which cables are guarded (*Dryden*).

MA'RLINESPIKE. *s.* a small piece of iron for fastening ropes together (*Bailey*).

MA'RLITE (Bituminous). See Marga.

MARLOW, or Great Marlow, a town of England, in the county of Buckingham, situated on the side of the river Thames, under the Chiltern hills, with a weekly market on Saturday. It is a borough town, and sends two members to the British parliament. The chief manufacture is making lace and paper. The establishment of the junior department of the Royal Military College is now at this place, the senior department being at High Wycombe. Marlow is 17 miles S. of Aylesbury, and 31 W. of London. Lon. 0. 45 W. Lat. 51. 35 N.

MA'RLPIT. *s.* (*marl* and *pit.*) Pit out of which marl is dug (*Woodward*).

MA'RLY. *a.* (from *marl.*) Abounding with marl (*Mortimer*).

Marly tufa, in mineralogy. See Tophus.

MA'RMALADE. Ma'rmalet. *s.* (*marmelade*, French.) The pulp of quinces boiled into a consistence with sugar (*Quincy*).

MA'RMARIDÆ, the inhabitants of that part of Libya which is between Cyrene and Egypt.

MARMOR. Marble. In mineralogy, a genus of the class earths, order calcareous. Consisting of carbonat of lime, carbonic acid gass and water; hardish, meagre to the touch, of a common form, lightish, composing whole mountains, or the greater part of them, or in detached pieces; burning into quick-lime, soluble for the most part in acids with effervescence. Fourteen species:

1. M. hammites. Ketton-stone. Compact limestone. Oolite. Pisolite. Opaque, without lustre, compact, consisting of accreted round granulations. Three other varieties.

β. Oolite: with the globules as large as the spawn of a fish.

γ. Cenchrite: with the globules as large as a millet-seed.

δ. Meconite: with the globules as large as the seeds of a poppy.

Found in stratified mountains in various parts of Britain, in Saxony, Brunswick, France, and Switzerland, always in large masses, with rarely the remains of animal substances: colour various; the granulations easily detached, and in small pieces may be crumbled between the fingers. Bath-stone and Portland-stone are varieties of this species.

2. M. granulare. Crude marble: foliated and granular lime-stone; nearly opake, lamellar, shining internally, hardish, spontaneously falling into granulations, not admitting a polish. Found in vast beds or strata in many mountains of Europe, constituting their principal parts; and never containing the vestiges of living bodies; granulations of different sizes; colour various; fracture foliated; always straight; is used for building, mending roads,

burning into lime; and as a flux for iron-stone.

3. M. micans. Parian, Paros, or Carrara marble: granular lime-stone. Diaphonous, white, lamellar, shining internally, hardish, spontaneously falling into finer granulations, receiving a polish. It has many varieties.

Found in ancient primitive mountains in vast strata; and with rarely vestiges of animal bodies, in Finland, Saxony, Sweden, Bohemia, near Carrara, in the islands Paros and Antiparos, and most mountainous countries; and is frequently the material of ancient buildings: sometimes contains a portion of quartz, so that it effervesces slowly with acids, and strikes fire with steel.

4. M. phosphoreum. Phosphorescent marble. Compact, diaphonous, snowy, emitting light in the dark when rubbed together. Found in primitive strata in the mountains Vesuvius and Ottajano, and nearly dissolves in nitric acid with a strong effervescence: not only when rubbed together in the dark, but if thrown in powder upon heated iron, it emits a phosphorescent light.

5. M. dolomæi. Dolomite. Effervescing slowly with acids, covering itself with a vitreous coating in the fire. Found in the Tyrolese mountains with hardly any lustre or transparency, and breaking into convex fragments; does not moulder by exposure to the atmospherical air:

It contains

| | | |
|---|---|---|
| Carbonat of lime | - | 4.429 |
| Alumina | - - | 0.586 |
| Magnesia | - - | 1.4 |
| Iron | - - - | 0.074 |
| Carbonic acid gass | - | 4.61 |
| | | 10.99 |

6. M. elasticum. Elastic marble. Elastic, yellowish-white, emitting a phosphorescent light when thrown on red-hot iron. Found on Mount Gothard in Switzerland, in large masses: surface rough and uneven; slightly flexible and evidently elastic when its length exceeds eleven or twelve times its thickness; effervesces and dissolves very slow with acids.

7. M. squammosum. Schuphichte kalkstein. *Nose orth. Br. Sieb.* Scaly limestone. Granular, compact, scaly. Found in Grapenburg, Finland, and Sweden, constituting the principal part of simple mountains, and containing no vestige of living bodies; colour white or reddish yellow; produces an indifferent quick-lime.

8. M. porosum. Filtering-stone. Perforated with pores, without lustre, opaque, not receiving a polish. Four varieties.

α. Perforated with pores, distilling water. Found in the quarries of Rudersdorf in Germany.

β. Spongy. Found in the Pyrenees, and province of Bearne.

γ. Hollow, and appearing rotten. Found near Idria, in Carniola.

δ. Cellular. Found in Alsace and the vast mountains of Bohemia; the pores are formed by pyrite formerly imbedded in it, but which has mouldered away and been washed out.

9. M. margodes. Margodes: fissile marble; calcareous marl; carbonat of lime and clay. Compact, without lustre, subopaque, not receiving a polish, with the fragments convex. Found in stratarial mountains of Bavaria, Frankfort, Sweden; mixed with a greater or less proportion of clay, and often marked with diaphonous veins in the form of shrubs; with frequently the vestiges of fishes and crabs, rarely shells or such animals as inhabit salt water; colour yellowish or reddish-white.

10. M. stratarium. Stratified marble: Alwarster. *It. Oel.* Mixed with clay, in water falling into powder, crackling in the fire, consisting of horizontal strata. Found in Oeland, Scania and the mountain Kinnekalle in Sweden, breaking into horizontal and perpendicular strata, and abounding in petrifactions; the upper strata are much harder than the lower.

11. M. florentinum. Florentine marble; pictured marble. Mixed with argil, opaque, compact, receiving a polish, curiously depicted. Found in Italy and Mount Sinai, yellowish-grey, with generally brown pictured marks of various forms.

12. M. nobile. Proper marble: soluble marble: carbonat of lime. Subopaque, compact, of a splintery fracture, receiving a high polish, and of a fine colour. Many varieties, as follow.

A. of one uniform colour.

α. Rufous. Numidian.
β. Flesh-colour.
γ. Red.
δ. Cinnamon. Marmo-canello.
ε. Yellow. Phengites.
ζ. Pale-yellow. Polombino antico.
η. Grey. Bardillo. Venetian.
θ. Blue. Of Chios and Narbon.
ι. Green. Verdello.
κ. Livid. Pardalian.

B. Variegated.

α. With bands.
β. With striæ.
γ. With lines. Marmo seritto
δ. With veins.
ε. With intermingled colours.
ζ. With spotted. Brocatello.
η. With ovellated. Orchio diparone.
θ. With dotted.
ι. With powdered. Marmo polveroso.
κ. With white. African.
λ. With black. Canary.
μ. With yellow. Porta Santa.
ν. With purplish. Lesbian.
ξ. With green. Lacedemonian.

Forms stratarial mountains in almost every part of the globe, exhibiting innumerable varieties of colour and depictment; is more or less loaded with petrifications, particularly of the testaceous kind; burns into a very good lime, and is chiefly used in sculpture, and costly buildings.

13. M. vulgatum. Common or compact limestone. Subopaque, compact, of a splintery

fracture, receiving an indifferent polish, or none; of a vile colour. Found in vast mountainous masses; sometimes in rounded lumps, as at Aberthaw in Glamorganshire, sometimes on the beach in the form of shingles; colour greyish, blueish, blackish, cream-colour, flesh-colour, yellowish, intermingled; differs from proper marble only in colour and polish, and is the material used for burning into lime.

14. M. fissile. Fissile limestone. Compact limestone. Opaque, compact, composed of thinner strata. Found in various parts of Britain, Sweden, and on Mount Calpi near Gibraltar, blue, grey, or brown, sometimes of two colours with alternate white, reddish-brown, grey, black, or greenish layers.

MARMORA, a river of European Turkey, which runs into the Strimon, six miles N.W. Emboli, in the province of Macedonia.

MARMORA, a town of European Turkey, in the province of Macedonia: thirty-four miles E.N.E. Saloniki.

MARMORA, an island in the Straits of Constantinople, or the Sea of Marmora, about ten miles long, and three wide: it contains a town of the same name, and a few villages; most of the inhabitants are Greek Christians. Lon. 45. 20 E. Lat. 40. 28 N.

MARMORA, or WHITE SEA, a gulf between the Straits of Constantinople and the Straits of Gallipoli, so called. It is about thirty leagues in length from east to west, and thirteen broad from north to south: it takes the name of Marmora from the island so called. This was the ancient Propontis.

MARMORA'TION. *s.* (*marmor*, Lat.) Incrustation with marble.

MARMO'REAN. *a.* (*marmoreus*, Latin.) Made of marble.

MARMORICA, a country of Africa, anciently inhabited by the Libyans. It was bounded on the east by Egypt, on the west by Cyrenaica, on the south by Sahara, or the desert of Libya Interior, and on the north by the Mediterranean; and was reckoned a part of Egypt. There is no distinct history of the country.

MARMOSE, in mastiology. See DIDELPHIS.

MARMOT, in mastiology. See ARCTOMYS.

MARNE, a department of France, including part of the late province of Champagne. It takes its name from a river which rises near Langres, and flowing N.W. joins the Seine, a little above Paris. Rheims is the archiepiscopal see, but Chalons is the capital.

MARNE (Upper), a department of France, including part of the late province of Champagne. Chaumont is the capital.

MARNE, a town of Persia, in the province of Chorasan, 200 miles N. of Herat.

MARNHULL, a village in Dorsetshire, on the Stour, five miles S.W. of Shaftsbury. The church is an ancient lofty building; the tower of which fell in 1710, in time of divine service, but was handsomely rebuilt.

MARO, a town of Italy, on the coast of Genoa, in a valley of the same name, eight miles N.W. of Oneglia, and 48 W.S.W. of Genoa. Lon. 7. 41 E. Lat. 44. 55 N.

MAROGNA, a town of Romania, with a Greek archbishop's see, seated near the Mediterranean, 70 miles S.W. of Adrianople. Lon. 25. 41 E. Lat. 40. 59 N.

MARONITES, in ecclesiastical history, a sect of Eastern Christians, who follow the Syrian rite, and are subject to the pope; their principal habitation being on mount Libanus.

Mosheim informs us, that the doctrine of the Monothelites, condemned and exploded by the council of Constantinople, found a place of refuge among the Mardaites, a people who inhabited the mounts Libanus and Antilibanus, and who, about the conclusion of the seventh century, were called Maronites, after Maro, their first bishop; a name which they still retain.

Faustus Nairon, a Maronite, settled at Rome, has published an apology for Maron, and the rest of his nation. His tenet is, that they really took their name from the Maron, who lived about the year 400, and of whom mention is made in Chrysostom, Theodoret, and the Menologium of the Greeks. He adds, that the disciples of this Maron spread themselves throughout all Syria; that they built several monasteries, and, among others, one that bore the name of their leader; that all the Syrians, who were not tainted with heresy, took refuge among them; and that, for this reason, the heretics of those times called them Maronites.

Mosheim observes, that the subjection of the Maronites to the spiritual jurisdiction of the Roman pontiff was agreed to with this express condition, that neither the popes nor their emissaries should pretend to change or abolish any thing that related to the ancient rites, moral precepts, or religious opinions of this people. The attachment of the Maronites to the church of Rome was always merely interested and never warm. Indeed it is certain that there are Maronites in Syria, who still behold the church of Rome with the greatest aversion and abhorrence; nay, what is still more remarkable, great numbers of that nation residing in Italy, even under the eye of the pontiff, opposed his authority during the last century, and threw the court of Rome into great perplexity. One body of these non-conforming Maronites retired into the vallies of Piedmont, where they joined the Waldenses; another, above above six hundred in number, with a bishop, and several ecclesiastics at their head, fled into Corsica, and implored the protection of the republic of Genoa, against the inquisitors.

The Maronites have a patriarch, who resides in the monastery of Cannubin, on mount Libanus, and assumes the title of patriarch of Antioch, and the name of Peter, as if he seemed desirous of being considered as the successor of that apostle. He is elected by the clergy and the people, according to the ancient custom; but, since their reunion with the church of Rome, he is obliged to have a bull of confirmation from the pope. He keeps a perpetual

celibacy, as well as the rest of the bishops his suffragans: as to the rest of the ecclesiastics, they are allowed to marry before ordination; and yet the monastic life is in great esteem among them. Their monks are of the order of St. Antony, and live in the most obscure places in the mountains, far from the commerce of the world

As to their faith, they agree in the main with the rest of the Eastern church. Their priests do not say mass singly; but all say it together, standing round the altar. They communicate in unleavened bread; and the laity have hitherto partaken in both kinds, though the practice of communicating in one has of late been getting footing, having been introduced by little and little. In Lent they eat nothing, unless it be two or three hours before sun-rising: their other fastings are very numerous.

*To* MAROON, to put one or more sailors ashore upon a desolate island, under pretence of their having committed some great crime. This detestable expedient has been repeatedly practised by some inhuman commanders of merchant-ships, particularly in the West Indies.

MAROT (Clement), the best French poet of his time, was born at Cahors in 1495, and was the son of John Marot, valet de chambre to Francis I. and poet to queen Anne of Brittany. He enjoyed his father's place of valet de chambre to Francis I. and was page to Margaret of France, wife to the duke of Alençon. In 1521 he followed that prince into Italy, and was wounded and taken prisoner at the battle of Pavia; but at his return to Paris was accused of heresy, and thrown into prison, from whence he was delivered by the protection of king Francis I. He at length retired to the queen of Navarre, then to the duchess of Ferrara, and in 1536 returned to Paris: but declaring openly for the Calvinists, he was obliged to fly to Geneva; which he at length left, and, retiring to Piedmont, died at Turin in 1544, aged 50. His verses are agreeably filled with natural beauties. La Fontaine acknowledged himself his disciple, and contributed greatly to restore to vogue the works of this ancient poet. Marot, besides his other works, has translated part of the Psalms into verse, which was continued by Beza, and are still sung in the Protestant churches abroad. Michael Marot, his son, was also the author of some verses; but they are not comparable to those of John, and much less to those of Clement Marot.—The works of the three Marots were collected and printed together at the Hague in 1731, in 3 vols. 4to. and in 6 vols. 12mo.

MAROTIER, a town of France, in the department of Lower Rhine, with a late Benedictine abbey, 18 miles N.W. of Strasburg. Lon. 7. 33 E. Lat. 48. 38 N.

MARPACH, a town of Suabia, in the duchy of Wirtemberg, situate on the Necker, eight miles N.N.E. of Stutgard, and 30 E.N.E. of Wildbad. Lon. 9. 7 E. Lat. 48. 51 N.

MARPESIA, in fabulous history, a celebrated queen of the Amazons, who waged a successful war against the inhabitants of mount Caucasus. The mountain was called Marpesius Mons, from its female conqueror.

MARPESSA, in fabulous history, a daughter of the Evenus, who married Idas, by whom she had Cleopatra, the wife of Meleager. Marpessa was tenderly loved by her husband, and when Apollo endeavoured to carry her away, Idas followed her ravisher with a bow and arrows, resolved on revenge. Apollo and Idas were separated by Jupiter, who permitted Marpessa to go with that of the two lovers whom she most approved of. She returned to her husband.

MARPESUS, a mountain of Paros, abounding in white marble, whence Marpesia cautes. The quarries are still seen by modern travellers.

MARPURG, a strong town of Germany, in the landgravate of Hesse Cassel, with a university, a castle, and a palace. It is seated on the Lahn, 15 miles S. of Waldeck, and 47 S.W. of Cassel. Lon. 9. 0 E. Lat. 50. 35 N.

MARQUARD (Freher), an eminent German civilian, born at Augsburg in 1565. He studied at Bourges under the learned Cujas, and acquired great skill in polite literature, and in the laws. At his return to Germany, he became counsellor to the elector Palatine, and professor of law at Heidelberg; and was afterwards sent by the elector Frederick IV. as his minister, into Poland, to Mentz, and several other courts. He died at Heidelberg in 1614. He wrote many works which are esteemed; the principal of which are, 1. De re monetaria veterum Romanorum, et hodierni apud Germanos imperii. 2. Rerum Bohemicarum scriptores. 3. Rerum Germanicarum scriptores. 4. Corpus historiæ Franciæ, &c.

MARQUE, or Letters of marque, in military affairs, are letters of reprisal, granting the subjects of one prince or state liberty to make reprisals on those of another.—They are so called from the German *marcke*, limit, frontier; as being "jus concessum in alterius principis marckas seu limites transeundi, sibique jus faciendi;" as being a right of passing the limits or frontiers of another prince, and doing one's self justice.

Letters of marque, among us, are extraordinary commissions granted by authority for reparation to merchants taken and despoiled by strangers at sea; and reprisals is only the retaking, or taking of one thing for another. The form in these cases is, the sufferer must first apply to the lord privy-seal, and he shall make out letters of request under the privy-seal; and if, after such request of satisfaction made, the party required do not, within convenient time, make due satisfaction or restitution to the party grieved, the lord-chancellor shall make him out letters of marque under the great seal; and by virtue of these he may attack and seize the property of the aggressor nation, without hazard of being condemned as a robber or pirate.

MARQUESAS, a group of islands in the S. Pacific Ocean, of which the most considerable are, St. Christina and St. Pedro. Captain

Cook, in his second voyage, lay some time at the first of these, which is situate in lon. 139. 9 W. and lat. 9. 55 S. It is high and steep, but has many vallies, which widen towards the sea, and are covered with fine forests to the summits of the interior mountains. The products of these and the other islands are bread-fruit, bananas, plantains, cocoa-nuts, scarlet-beans, paper-mulberries (of the bark of which their cloth is made), casuarinas, with other tropical plants and trees, and hogs and fowls. The natives are well made, strong, and active; of a tawny complexion, but look almost black, by being punctured over the whole body. They go almost naked, having only a small piece of cloth, perfectly resembling that made by the people of Otaheite, round their waist and loins. Their beard and hair are of a fine jet black, like those of the other natives of the torrid zone. Their arms are clubs and spears, and their government, like that of the Society Islands, monarchical. The drink of the Marquesans is water only, cocoa-nuts being rather scarce. Their music, musical instruments, dances, and canoes, very much resemble those of Otaheite. In short, the inhabitants of the Marquesas, Society and Friendly Islands, Easter Island, and New Zealand, seem to have all the same origin; their language, manners, customs, &c. bearing a great affinity in many respects.

MARQUETRY, in-laid work; a curious kind of work, composed of pieces of hard fine wood of different colours, fastened, in thin slices, on a ground, and sometimes enriched with other matters, as tortoise-shell, ivory, tin, and brass. There is another kind of marquetry made, instead of wood, of glasses of various colours; and a third, where nothing but precious stones and the richest marbles are used: but these are more properly called mosaic-work. See Mosaic.

The art of inlaying is very ancient; and is supposed to have passed from the east to the west, as one of the spoils brought by the Romans from Asia. Indeed it was then but a simple thing; nor did it arrive at any tolerable perfection till the 15th century among the Italians; it seems, however, to have arrived at its height in the 17th century among the French.

Till John of Verona, a cotemporary with Raphael, the finest works of this kind were only black and white, which are what we now call morescos: but that religious, who had a genius for painting, stained his woods with dyes or boiled oils, which penetrated them. But he went no farther than the representing buildings and perspectives, which require no great variety of colours. Those who succeeded him not only improved on the invention of dyeing the woods, by a secret which they found of burning them without consuming, which served exceedingly well for the shadows; but had also the advantage of a number of fine new woods of naturally bright colours, by the discovery of America. With these assistances the art is now capable of imitating any thing; whence some call it the art of painting in wood.

The ground whereon the pieces are to be ranged and glued is ordinarily of oak or fir well dried; and, to prevent warping, is composed of several pieces glued together. The wood to be used, being reduced into leaves, of the thickness of a line, is either stained with some colour, or made black for shadow; which some effect by putting it in sand extremely heated over the fire, others by steeping it in lime-water and sublimate, and others in oil of sulphur. Thus coloured, the contours of the piece are formed according to the parts of the design they are to represent.

The leaves to be formed, of which there are frequently three, four, or more joined together, are, after they have been glued on the outermost part of the design, whose profile they are to follow, put within the chaps of the vice; then the workman pressing the treddle, and thus holding fast the piece, with his saw runs over all the outlines of his design. By thus joining or forming three or four pieces together, not only time is saved, but also the matter is the better enabled to sustain the effort of the saw, which, how fine soever it may be, and how slightly soever it may be conducted by the workman, except this precaution were taken, would be apt to raise splinters, and ruin the beauty of the work. All the pieces having been thus formed by the saw, and marked, in order to their being known again, each is veneered, or fastened in its place, on the common ground, with the best English glue; and this being done, the whole is set in a press to dry, planed over and polished with the skin of the sea-dog, wax, and shave-grass, as in simple veneering, and the fine branches and more delicate parts of the figures are touched up and finished with a graver.

MARQUIS, a title of honour, next in dignity to that of duke, first given to those who commanded the marches, that is, the borders and frontiers of countries. Marquisses were not known in England till king Richard II. in the year 1337, created his great favourite, Robert Vere, the earl of Oxford, marquis of Dublin; since which time there have been many creations of this sort, though at present there are twelve English, two Scotch, and nine Irish marquisses. The manner of creating a marquis differs in nothing from that of a duke, except the difference of the titles, and the marquis's being conducted by a marquis and an earl, while a duke is led by a duke and a marquis: he is also girt with a sword, has a gold verge put into his hand, and his robe or mantle is the same as those of a duke, with only this difference, that a duke's mantle has four guards of ermine, and a marquis's only three and a half. The title given him in the style of the heralds, is most noble and potent prince. His cap is the same as a duke's, and the difference between their coronets consists in the duke's being adorned with only flowers or leaves, while the marquis's has flowers and pyramids with pearls on them intermixed, to shew that he is a degree between a duke and an earl.

MA'RQUISATE. *s.* (*marquisat*, French.) The seniory of a marquis.

MA'RRER. *s.* (from *mar.*) One who spoils or hurts any thing (*Ascham*).

MA'RRIAGE. *s.* (*mariage*, French.) 1. The act of uniting a man or woman for life (*Taylor*). 2. State of perpetual union.

MARRIAGE, a contract, both civil and religious, between a man and a woman, by which they engage to live together in mutual love and friendship for the ends of procreation, &c.

Marriage is part of the law of nations, and is in use among all people. The Romanists account it a sacrament. The woman with all her moveable goods, immediately upon marriage, passes wholly *in potestatem viri*, into the power and disposal of the husband.

The first inhabitants of Greece lived together without marriage. Cecrops, king of Athens, is said to have been the first author of this honourable institution among that people. After the commonwealths of Greece were settled, marriage was very much encouraged by their laws, and the abstaining from it was discountenanced and in many places punished. The Lacedemonians were very remarkable for their severity towards those who deferred marriage beyond a limited time, as well as to those who wholly abstained from it. The Athenians had an express law, that all commanders, orators, and persons intrusted with any public affair, should be married men. Polygamy was not commonly tolerated in Greece. The time of marriage was not the same in all places. The Spartans were not permitted to marry till they arrived at their full strength; the reason assigned for which custom by Lycurgus was, that the Spartan children might be strong and vigorous: and the Athenian laws are said to have once ordered, that men should not marry till 35 years o age. The season of the year which they preferred for this purpose was the winter, and particularly the month of January, called Gamelion. The Greeks thought it scandalous to contract marriage within certain degrees of consanguinity; whilst most of the barbarous nations allowed incestuous mixtures.

Most of the Grecian states, especially such as made any figure, required their citizens should match with none but citizens, and the children were not allowed to marry without the consent of their parents. The usual ceremonies in promising fidelity was kissing each other, or giving their right hands, which was a general form of ratifying all agreements. Before the marriage could be solemnized, the gods were to be consulted, and their assistance implored by prayers and sacrifices, which were offered to some of the deities that superintended these affairs, by the parents, or nearest relations of the persons to be married. When the victim was opened, the gall was taken out and thrown behind the altar, as being the seat of anger and malice, and therefore the aversion of all the deities who had the care of love, as well as those who became their votaries. For the particularities relating to the bride and bridegroom, see BRIDE and BRIDEGROOM.

The ceremonies of the Spartan marriages being different from all others, deserve to be mentioned at length, as related by Plutarch. "When the Spartans had a mind to marry, their courtship was a sort of rape upon the persons they had a fancy for; and those they chose not tender and half-children, but in the flower of their age, and full ripe for a husband. Matters being agreed between them, the νυμφευτρια, or woman that contrived and managed the plot, shaved off the bride's hair close to her skin, dressed her up in man's clothes, and left her upon a mattress: this done, the bridegroom entered in his common clothes, sober and composed, as having supped at his ordinary in the common hall, and stole as privately as he could into the room where the bride lay, untied her virgin girdle, whence λυειν ζωνην, is to deflower, and took her into his embraces. Having stayed a short time with her, he returned to his comrades, with whom he continued to spend his life, remaining with them as well by night as by day, unless when he stole a short visit to his bride; and that could not be done without a great deal of circumspection, and fear of being discovered. Nor was she wanting (as may be supposed) on her part, to use her wit in watching the most favourable opportunities for their meeting, and making appointments when company was out of the way. In this manner they lived a long time, insomuch that they frequently had children by their wives before they saw their faces by day-light. The interview being thus difficult and rare, served not only for a continual exercise of their temperance, and farthered very much the ends and intentions of marriage, but was a means to keep their passion still alive, which flags and decays, and dies at last by too easy access, and long continuance with the beloved object." Potter, Archæol. book iv. c. xi. p. 295, seq.

The Romans, as well as the Greeks, disallowed of polygamy. A Roman might not marry any woman who was not a Roman. Among the Romans, the kalends, nones, and ides of every month, were deemed unlucky for the celebration of marriage, as was also the feast of the parentalia, and the whole month of May. The most happy season in every respect was that which followed the ides of June.

The Roman laws speak of second marriages in very hard and odious terms: *Matre jam secundis nuptiis funestata*, L. iii. C. de sec. nuptiis. By these laws it was enacted, that the effects of the husband or wife deceased should pass over to the children, if the survivor should marry a second time. By the law *Hac edictali*, Cod. de sec. nupt. the survivor, upon marrying a second time, could not give the person he married a portion more than equal to that of each of the children. In the primitive church, the respect to chastity was carried so high, that a second marriage was accounted no other than a lawful whoredom, or a species of bigamy; and there are some ancient canons, which forbid the ecclesiastics from being present at second marriages.

Marriage, by the Mosaic law, was subject to

several restrictions; thus by Levit. chap. xviii. ver. 16. a man was forbid to marry his brother's widow, unless he died without issue; in which case, it became enjoined as a duty. So it was forbid to marry his wife's sister, while she was living, ver. 18., which was not forbidden before the law, as appears from the instance of Jacob.

The ancient Roman law is silent on this head; and Papinian is the first who mentions it, on occasion of the marriage of Caracalla. The lawyers who came after him stretched the bonds of affinity so far, that they placed adoption on the same foot with nature.

Affinity, according to the modern canonists, renders marriage unlawful to the fourth generation, inclusive; but this is to be understood of direct affinity, and not of that which is secondary or collateral. *Affinis mei affinis, non est affinis meus.* It is farther to be observed that this impediment of marriage does not only follow an affinity contracted by lawful matrimony, but also that contracted by a criminal commerce; with this difference, that this last does not extend beyond the second generation; whereas the other, as has been observed, reaches to the fourth.

In Germany, they have a kind of marriage called morganatic, wherein a man of quality contracting with a woman of inferior rank, he gives her the left hand in lieu of the right; and stipulates in the contract, that the wife shall continue in her former rank or condition, and that the children born of them shall be of the same; so that they become bastards as to matters of inheritance, though they are legitimate in effect. They cannot bear the name or arms of the family.

None but princes, and great lords of Germany, are allowed this kind of marriage. The universities of Leipsic and Jena have declared against the validity of such contracts; maintaining, that they cannot prejudice the children, especially when the emperor's consent intervenes in the marriage.

The Turks have three kinds of marriages, and three sorts of wives; legitimate, wives in kebin, and slaves. They marry the first, hire the second, and buy the third.

The people in Java marry and have children at nine or ten years old, and the women leave child-bearing before they are thirty; and at Tonquin there are women common to any that will hire them, at eight or nine years of age.

Among all the savage nations, whether in Asia, Africa, or America, the wife is commonly bought by the husband from her father, or those other relations who have an authority over her; and the conclusion of a bargain for this purpose, together with the payment of the price, has, therefore, become the usual form or solemnity in the celebration of their marriages. The Hebrews also purchased their wives, by paying down a competent dowry for them; and Aristotle makes it one argument to prove that the ancient Grecians were an uncivilized people, because they used to buy their wives; and in proportion as they laid aside their barbarous manners, they left off this practice.

Taking marriage in the light of a civil contract, the law treats it as it does all other contracts; allowing it to be good and valid in all cases where the parties, at the time of making it, were in the first place willing to contract; secondly, able to contract; and lastly, actually did contract, in the proper forms and solemnities required by law.

By several statutes, a penalty of 100l. is inflicted for marrying any persons without banns or licence; but by 26 George II. c. 33, if any person shall solemnize matrimony without banns or licence, obtained from some persons having authority to grant the same, or in any other place than a church or chapel where banns have been usually published, unless by special licence from the archbishop of Canterbury, he shall be guilty of felony, and transported for fourteen years, and the marriage shall be void. Marriages according to the laws of any other country are valid in England, if duly solemnized in another country, as marriages in Scotland are; but by 26 George II. c. 33, s. 11, marriages by licence, where the parties are not twenty-one, must not be without consent of the father or guardian of the party. If the guardian or mother is beyond sea, or insane, the chancellor will proceed upon relation in their stead. Questions have lately arisen, whether this act applies to illegitimate children, and the civilians have held that it does. Marriages cannot be solemnized between persons within the Levitical degrees, but if solemnized, they are not void till after sentence of the proper court. Promises of marriage, and pre-contracts, do not prevent the parties from lawfully marrying other persons: but an action lies for a breach of the contract. Marriage brokage bonds are void in equity, and all contracts in restraint of marriage generally are void; but contracts and legacies, upon condition not to marry any particular person, or without proper consent, are allowed, though if there is not a devise over the legacy is vested nevertheless. To marry a woman an heiress forcibly, is a capital felony by 3 Henry VII. c. 2, and 39 Elizabeth, c. 9.

A wife cannot leave her husband. If she elope from him, she loses her dower, unless she returns and is reconciled. An action of trespass lies for taking away a wife, with the goods of her husband, and also for criminal conversation with the wife of any one.

If a man ill use and turn his wife away, she has credit for necessaries wherever she goes, and he is obliged to pay her debts; but it is otherwise if she elopes or commits adultery. A married woman cannot be sued for her own debts, although she has a separate maintenance.

Divorces are of two kinds, absolute, and from bed and board. The former can only be by act of parliament, unless it is for some original defect in the marriage; the latter is allowed on account of ill-treatment, &c., and then the wife has alimony or maintenance allowed her.

For the proportions which marriages bear to births, and births to burials, in several parts of Europe, Mr. Derham gives us the following table:

| Names of Places. | Marriages to Births, as | Births to Burials, as |
|---|---|---|
| England in general | 1 to 4.63 | 1.12 to 1 |
| London | 1 to 4 | 1. to 1.1 |
| Hantshire, from 1569 to 1658 | 1 to 4 | 1.2 to 1 |
| Tiverton in Devonshire, from 1656 to 1664 | 1 to 3.7 | 1.26 to 1 |
| Cranbrook in Kent, from 1560 to 1649 | 1 to 3.9 | 1.6 to 1 |
| Aynho in Northamptonshire, for 118 years | 1 to 6 | 1.9 to 1 |
| Upminster in Essex, for 100 years | 1 to 4.6 | 1.8 to 1 |
| Frankfort on the Maine, in 1695 | 1 to 3.7 | 1.2 to 1 |
| Old, Middle, and Lower Mark, in 1698 | 1 to 3.7 | 1.9 to 1 |
| Dominions of the Elector of Brandenburg, in 1698 | 1 to 3.7 | 1.5 to 1 |
| Breshaw in Silesia, from 1687 to 91 | — | 1.6 to 1 |
| Paris, in 1670, 1671, 1672 | 1 to 4.7 | 1.6 to 1 |

The following table, similar to the preceding, is formed from the observations collected and referred to by Dr. Price. It is taken from Chambers's Cyclopædia, by Dr. Rees:

| Names of Places. | Marriages to Births, as | Births to Burials, as |
|---|---|---|
| London, Annual medium from 1716 to 1736 | — | 18,000 to 26,529, or 1 to 1.4, &c. |
| ——— from 1759 to 1768 | — | 15,710 to 22,956, or 1 to 1.4, &c. |
| Northampton, ditto, from 1741 to 1770 | — | 155 to 191, or 1 to 1.2, &c. |
| Norwich, ditto, from 1740 to 1769 | — | 1057 to 1206, or 1 to 1.1, &c. |
| Shrewsbury, ditto, from 1762 to 1768 | — | 301 to 329, or 1 to 1.09, &c. |
| Manchester and Salford, exclusive of dissenters | | |
| Ditto, from 1755 to 1759 | — | 756 to 743, ——— |
| Ditto, ditto, including dissenters, from 1768 to 1772 | — | 1098 to 958, or 1.14, &c. to 1. |
| Gainsborough in Lincolnshire, ditto, from 1752 to 1771 | 1 to 3.7 | 126 to 105, or 1.2 to 1. |
| Madeira, ditto, from 1759 to 1766 | 1 to 4.68 | 2201 to 1293, or 1.7 to 1. |
| Boston in New England, from 1731 to 1752 | — | 538 to 608, or 1 to 1.13, &c. |
| Christiana in Norway, in 1761 | — | 11,024 to 6929, or 1.5 to 1. |
| Paris, mean of some of the last years | 1 to 4.3 | 19,100 to 19,400, or 1 to 1.01, &c. |
| Vienna, annual medium from 1757 to 1769 | — | 5800 to 6600, or 1 to 1.1, &c. |
| Amsterdam, ditto, for some of the last years | 1 to 1.9, &c. | 4600 to 8000, or 1 to 1.1, &c. |
| Copenhagen, ditto | 1 to 3.04, &c. | 2700 to 3300, or 1 to 1.2, &c. |
| Berlin, ditto, for five years, ending at 1759 | 1 to 3.9, &c. | 3855 to 5054, or 1 to 1.3, &c. |
| Breslaw, ditto, from 1633 to 1734 | — | 1089 to 1256, or 1 to 1.15, &c. |
| ———, ditto, from 1717 to 1725 | — | 1252 to 1507, or 1 to 1.2, &c. |
| Rome, ditto, from 1759 to 1761 | — | 5167 to 7153, or 1 to 1.3, &c. |
| Vaud in Switzerland, ditto, for 10 years before 1766 | 1 to 3.9 | 3155 to 2504, or 1.2, &c. to 1. |

It would hence appear, and indeed is pretty universally admitted, that marriages do, one with another, each produce about *four* births.

Dr. Price observes, that the births at Paris are above four times the weddings; and therefore it may seem, that in the most healthy country

situations, every wedding produces above four children; and though this be the case in Paris, for reasons which he has given, he has observed nothing like it in any other great town. He adds, that from comparing the births and weddings in countries and towns where registers of them have been kept, it appears, that in the former, marriages one with another seldom produce less than four children each; generally between four and five, and sometimes above five; but in towns seldom above four, generally between three and four, and sometimes under three. It is necessary to be observed here, that though the proportion of annual births to weddings has been considered as giving the true number of children derived from each marriage, taking all marriages one with another; yet this is only true, when, for many years, the births and burials have kept nearly equal. Where there is an excess of the births, occasioning an increase, the proportion of annual births to weddings must be less than the proportion of children derived from each marriage; and the contrary must take place where there is a decrease. Mr. Kerssebooom from his observations, estimates the duration of *marriages*, one with another, as in the following table:

Those whose ages, taken together, make

| | | |
|---|---|---|
| 40 live together between | 24 and | 25 years. |
| 50 . . | 22 | 23 |
| 60 . . | 23 | 21 |
| 70 . . | 19 | 20 |
| 80 . . | 17 | 18 |
| 90 . . | 14 | 15 |
| 100 . . | 12 | 13 |

Phil. Trans. No. 468. sect. iii. p. 319.

Dr. Price has shewn, that on De Moivre's hypothesis, or that the probabilities of life decrease uniformly (see COMPLEMENT OF LIFE), the duration of survivorship is equal to the duration of marriage, when the ages are equal; or, in other words, that the expectation of two joint lives, the ages being equal, is the same with the expectation of survivorship; and, consequently, the number of survivors, or (which is the same, supposing no second marriages) of widows and widowers alive together, which will arise from any given set of such marriages constantly kept up, will be equal to the whole number of marriages, or half of them (the number of widows in particular) equal to half the number of marriages. Thus, the expectation of two joint lives, both 40, is the third of 46 years, or their complement, i. e. 15 years and 4 months; and this is also the expectation of the survivor. That is, supposing a set of marriages between persons all 40, they will, one with another, last just this time, and the survivors will last the same time. In adding together the years which any great number of such marriages, and their survivorships, have lasted, the sums would be found to be equal. It is observed farther, that if the number expressing the expectation of single or joint lives, multiplied by the number of single or joint lives whose expectation it is, be added annually to a society or town, the sum gives the whole number living together, to which such an annual addition would in time grow: thus, since 19, or the third of 57, is the expectation of two joint lives, whose common age is 29, or common complement 57, twenty marriages every year between persons of this age would, in fifty-seven years, grow to 20 times 19, or 380 marriages always existing together. The number of survivors also arising from these marriages, and always living together, would, in twice 57 years, increase to the same number. Moreover, the particular proportion that becomes extinct every year, out of the whole number constantly existing together of single or joint lives, must, wherever this number undergoes no variation, be exactly the same with the expectation of those lives, at the time when their existence commenced. Thus, if it were found that a nineteenth part of all the marriages among any body of men, whose numbers do not vary, are dissolved every year by the deaths of either the husband or wife, it would appear that 19 was, at the time they were contracted, the expectation of these marriages. Dr. Price observes, that the annual average of weddings among the ministers and professors in Scotland for the last twenty-seven years has been thirty-one; and the average of married persons for seventeen years, ending in 1767, had been 667. This number, divided by 31, gives 21½, the expectation of marriage among them, which, he says, is above 2½ years more than the expectation of marriage would be by Dr. Halley's table, on the supposition that all first, second, and third marriages may be justly considered as commencing, one with another, so early as the age of thirty; and he has proved that the expectation of two equal joint lives is to the expectation of a single life of the same age as 2 to 3, consequently, the expectation of a single life at 30, among the ministers in Scotland, cannot be less than 32.25. If we suppose the mean ages of all who marry annually to be 33 and 25, the expectation of every marriage would be 19 years; or one with another they would be all extinct in 19 years; the marriages which continue beyond this term, though fewer in number, enjoying among them just as much more duration as those that fall short of it enjoy less. But it appears from the observations and tables of Mr. Muret, that, in the district of Vaud (dividing half the number of married persons, viz. 38,328, by the annual medium of weddings, viz. 808) the expectation of marriage is only 23¼ years: so much higher are the probabilities of life in the country than in towns, or than they ought to be, according to De Moivre's hypothesis. Price's Obs. &c. See EXPECTATION OF LIFE, LIFE-ANNUITIES, and SURVIVORSHIP.

MA'RRIAGEABLE. *a.* (from *marriage*). 1. Fit for wedlock; of age to be married. 2. Capable of union (*Milton*).

MA'RRIED. *a.* (from *marry*). Conjugal; connubial (*Dryden*).

MARROW. The concrete oily matter secreted into the bony cells and canals of animals; as *suet* is that which is secreted into the cells of the cellular membrane about the kid-

neys, and other abdominal viscera of the herbivorous and frugivorous tribes; and *spermaceti* that secreted in the cranium of the cachalot or physeter macrocephalus. The marrow of the ox, on distillation, affords similar products to suet, except that there passes first into the receiver a white suet resembling the butter of wax. It affords an insipid water, much oil, the greater part of which again becomes fixed, and a little phlegm: an acid is hence also obtained.

MARROW (Spinal). See MEDULLA.

MARROW. Medulla. In botany, the pith of a vegetable. The inner vesicular substance, or that which clothes the inner surface of a hollow trunk, consisting chiefly of air-vessels; but formerly supposed by Linnéus to have a near resemblance to the medulla spinalis of animals, on which account he thus named it. Its place, as vegetables advance to maturity, is supplied by the air-vessels of the surface of the branches and leaves, and in the same proportion it becomes gradually obliterated.

MA'RROWBONE. *s.* (*marrow* and *bone*). 1. Bone boiled for the marrow. 2. In burlesque language, the knees (*L'Estr.*).

MA'RROWFAT. *s.* A kind of pea.

MA'RROWLESS. *a.* (from *marrow*). Void of marrow (*Shakspeare*).

MARRUBIUM. White horehound. In botany, a genus of the class didynamia, order gymnospermia. Calyx salver-shaped, rigid, tenstriate; upper lip of the corol cloven, linear, straight. Fourteen species: chiefly natives of Spain and the Levant; one indigenous to the Cape; one common to our own country. In about half, the calyx is five-toothed, in the rest ten-toothed. The species of most note is the M. vulgare: leaves roundish-ovate, toothed, wrinkled, and veined; calyx with setaceous, hooked teeth. Found wild on our own wastes. The leaves have a moderately strong smell of the aromatic kind, but not agreeably so; the disagreeableness, however, diminishes by drying, and at last is totally dissipated: their taste is very bitter, penetrating, diffusive, and durable in the mouth. These qualities claim for it a medicinal character; but it does not appear to be possessed of any great or peculiar virtue. It is nevertheless a favourite remedy with the common people in coughs and asthmas.

MARRUBIUM, or MARRUVIUM, a place near the Liris in Italy.

*To* MA'RRY. *v. a.* (*marier*, French.) 1. To join a man and a woman (*Gay*). 2. To dispose of in marriage (*Bacon*). 3. To take for husband or wife (*Shakspeare*).

*To* MA'RRY. *v. n.* To enter into the conjugal state (*Shakspeare*).

MARS, the god of war, was the son of Jupiter and Juno, or of Juno alone, who had wished to become a mother without the assistance of the other sex, like Jupiter, who had produced Minerva all armed from his head, and she was shown a flower by Flora in the plains near Olenus, whose very touch made women pregnant. The education of Mars was entrusted by Juno to the god Priapus, who instructed him in dancing and every manly exercise. His trial before the celebrated court of the Areopagus, according to the authority of some authors, for the murder of Hallirhotius, forms an interesting epoch. Mars having killed Hallirhotius, Neptune's son, for having violated the chastity of his daughter, Alcippe, Neptune accused him before the tribunal of twelve gods, where he was acquitted. The place in Athens where this judgment was pronounced has been since called Αρειος πάγος, because it was an eminence or a rock; and the judges from thence took the name of Areopagites. This action of Mars might very well induce the Greeks to attribute unto him what the most ancient and eastern nations had already published concerning the god of war. Dionysius of Halicarnassus says, that the Sabines and the Romans gave the name of Quirinus to the god Enyalius, being in some doubt whether he were god Mars himself, or another god who presided over military adventures. The amours of Mars and Venus are greatly celebrated. The god of war gained the affections of Venus, but Apollo informed Vulcan of his wife's debaucheries. Vulcan secretly laid a net around the bed, and the two lovers were exposed to the ridicule of all the gods, till Neptune prevailed upon the husband to set them at liberty. In the wars of Jupiter and the Titans, Mars was seized by Otes and Ephialtes, and confined for fifteen months, till Mercury procured him his liberty. During the Trojan war he took the side of the Trojans, and defended the favourites of Venus with uncommon activity. His temples were not numerous in Greece, but in Rome he received unbounded honours, and the warlike Romans were proud of paying homage to a deity whom they esteemed as the patron of their city, and the father of the first of their monarchs. His priests, among the Romans, were called Salii; they were first instituted by Numa, and their chief office was to guard the sacred Ancylla, one of which, as was supposed, had fallen down from heaven. Mars was generally represented in the naked figure of an old man, armed with a helmet, a pike, and a shield. He generally rode in a chariot drawn by furious horses, which the poets called Flight and Terror. The surnames of Mars are, Gradivus, Mavors, Quirinus, Salisubsulus, among the Romans. The Greeks called him Ares, and he was the Camulus of the Gauls, and the Mamers of Carthage. Mars was the father of Cupid, Anterus, and Harmonia, by the goddess Venus. He was the reputed father of Romulus. He presided over gladiators, and was the god of hunting and of whatever exercise or amusements have something manly and warlike.

MARS, in astronomy, the planet that revolves next beyond the earth in our system. For its dimensions and the elements of its orbit, see ASTRONOMY.

The spots on the surface of this planet were first observed in 1666 by Cassini at Bologna,

with a telescope about $16\frac{1}{2}$ feet long; and continuing to observe them for a month, he found they came into the same situation in twenty-four hours and forty minutes. The planet was observed by some astronomers at Rome with longer telescopes, but they assigned to it a rotation in thirteen hours only. This, however, was afterwards shewn by M. Cassini to have been a mistake, and to have arisen from their not distinguishing the opposite sides of the planet, which, it seems, have spots pretty much alike. He made further observations on the spots of this planet in 1670, from whence he drew an additional confirmation of the time the planet took to revolve. The spots were again observed in subsequent oppositions, particularly for several days in 1704, by Maraldi, who took notice that they were not always well defined, and that they not only changed their shape frequently in the space between two oppositions, but even in the space of a month. Some of them, however, continued of the same form long enough to ascertain the time of the planet's revolution. Among these there appeared this year an oblong spot, resembling one of the belts of Jupiter when broken. It did not reach quite round the body of the planet, but had, not far from the middle of it, a small protuberance towards the north, so well defined, that he was thereby enabled to settle the period of its revolution at twenty-four hours thirty-nine minutes, only one minute less than what Cassini had determined it to be.

Besides these dark spots, former astronomers took notice that a segment of his globe about the south pole exceeded the rest of his disk so much in brightness, that it appeared beyond them as if it were the segment of a larger globe. Maraldi informs us that this bright spot had been taken notice of for sixty years, and was more permanent than the other spots on the planet. One part of it is brighter than the rest, and the least bright part is subject to great changes, and has sometimes disappeared.

A similar brightness about the north pole of Mars was also sometimes observed; and these observations are now confirmed by Dr. Herschel, who has viewed the planet with much better instruments, and much higher magnifying powers than any other astronomer ever was in possession of. His observations were made with a view to determine the figure of the planet, the position of his axis, &c. See Philosophical Transactions, vol. lxxiv.

"The analogy," says Dr. Herschel, "between Mars and the earth is, perhaps, by far the greatest in the whole solar system. Their diurnal motion is nearly the same; the obliquity of their respective ecliptics not very different. Of all the superior planets, the distance of Mars from the sun is by far the nearest alike to that of the earth; nor will the length of the Martial year appear very different from what we enjoy, when compared to the surprising duration of the years of Jupiter, Saturn, and the Herschel. If then we find that the globe we inhabit has its polar region frozen and covered with mountains of ice and snow, that only partly melt when alternately exposed to the sun, I may well be permitted to surmise, that the same causes may probably have the same effect on the globe of Mars; that the bright polar spots are owing to the vivid reflection of light from frozen regions, and that the reduction of those spots is to be ascribed to their being exposed to the sun. In the year 1781 the south polar spot was extremely large, which we might well expect, as that pole had but lately been involved in a whole twelvemonth's darkness and absence of the sun; but in 1783 I found it considerably smaller than before, and it decreased continually from the 20th of May till about the middle of September, when it seemed to be at a stand. During this last period the south pole had already been above eight months enjoying the benefit of summer, and still continued to receive the sun-beams, though, towards the letter end, in such an oblique direction as to be but little benefited by them. On the other hand, in the year 1781, the north polar spot which had been its twelvemonth in the sunshine, and was but lately returning into darkness, appeared small, though undoubtedly increasing in size. Its not being visible in the year 1783 is no objection to these phenomena, being owing to the position of the axis, by which it was removed out of sight. It has been commonly related by astronomers, that the atmosphere of this planet is possessed of such strong refractive powers as to render the small fixed stars near which it passes invisible. Dr. Smith relates an observation of Cassini, where a star in the water of Aquarius, at the distance of six minutes from the disk of Mars, became so faint before its occultation, that it could not be seen by the naked eye, nor with a three-feet telescope. This would indicate an atmosphere of a very extraordinary size and density; but the following observations of Dr. Herschel seem to show that it is of much smaller dimensions. "1783, October 26th. There are two small stars preceding Mars, of different sizes; with 460 they appear both dusky red, and are pretty unequal; with 218 they appear considerably unequal. The distance from Mars of the nearest, which is also the largest, with 227 measured 3′ 26″ 20‴. Sometime after, the same evening, the distance was 3′ 8″ 55‴, Mars being retrograde. Both of them were seen very distinctly. They were viewed with a new twenty-feet reflector, and appeared very bright. October 27th, the small star is not quite so bright in proportion to the large one as it was last night, being a good deal nearer to Mars, which is now on the side of the small star; but when the planet was drawn aside, or out of view, it appeared as plainly as usual. The distance of the small star was 2′ 5″ 25‴. The largest of the two stars (adds he) on which the above observations were made cannot exceed the twelfth, and the smallest the thirteenth or fourteenth magnitude; and I have no reason to suppose

that they were any otherwise affected by the approach of Mars than what the brightness of its superior light may account for. From other phenomena it appears, however, that this planet is not without a considerable atmosphere; for besides the permanent spots on its surface, I have often noticed occasional changes of partial bright belts, and also once a darkish one in a pretty high latitude; and these alterations we can hardly ascribe to any other cause than the variable disposition of clouds and vapours floating in the atmosphere of the planet."

Mars. (*Mars.*) A name for iron in alchemy.

MARSAIS (Cæsar, Chesneau du), a French grammarian, born at Marseilles in 1676. He became a member of the congregation of the oratory, which he soon quitted, and went to Paris, where he became an advocate, but left that profession also, and engaged in the business of teaching youth. He had a share in the Encyclopedie, and died in 1756. His principal works are, 1. An Explanation of the Doctrine of the Gallican Church, with respect to the Pretences of the Court of Rome, 12mo.; 2. A reasonable Method of learning the Latin Language, 12mo.; 3. A Treatise on Tropes, 8vo.; 4. Les Véritables Principes de la Grammaire, 4to.

MARSAL, a town of France, in the department of Muerthe. It is remarkable for its salt-works, and seated on the Selle, in a marsh of difficult access; which, with the fortifications, renders it an important place. It is 17 miles NE. of Nanci. Lon. 6. 41 E. Lat. 48. 49 N.

MARSAQUIVER, or Marsalquiver, a strong and ancient town of Algiers, in Tremesen, with one of the best harbours in Africa. It was taken by the Spaniards in 1732; and is seated on a rock, near a bay of the Mediterranean, three miles from Oran. Lon. 0. 10 W. Lat. 36. 1 N.

MARSEILLES, a strong city of France, in the department of the Mouths of the Rhone. It was lately an episcopal see; and the inhabitants are computed to be 90,000. It was so celebrated in the time of the Romans, that Cicero styled it the Athens of the Gauls, and Pliny called it the Mistress of Education. It is seated on the Mediterranean, at the upper end of a gulf, covered and defended by many small islands; and it is partly on the declivity of a hill, and partly in a plain. It is divided into the Old Town, or the City, and the New Town. The first appears like an amphitheatre to the vessels which enter the port; but the houses are mean, and the streets dirty, narrow, and steep. In this part is the principal church, built by the Goths, on the ruins of the temple of Diana. The New Town is a perfect contrast to the City, with which it has a communication by one of the finest streets imaginable; and its other streets, the squares, and the public buildings are beautiful. With respect to commerce, Marseilles has been called Europe in Miniature, on account of the variety of dresses and languages which are here seen and heard. The port is a basin of an oval form, 3480 feet long, by 960 in its widest part, with 18 or 20 feet depth of water, and is defended by a citadel and a fort. In 1649 the plague raged with great violence, and with still greater in 1720, when it carried off 50,000 of the inhabitants. The memory of this great calamity is preserved by two pictures, painted by Serre, in the hall of the town-house. In 1793 Marseilles revolted against the French National Convention, but was very soon reduced. It is 13 miles N.W. of Toulon, and 362 S. by E. of Paris. Lon. 5. 27 E. Lat. 43. 18 N.

MARSH, Mars, Mas, are derived from the Saxon merrc, fen (*Gibson*).

Marsh *s.* (merrc, Saxon.) A fen; a bog; a swamp; a watery tract of land (*Drayton*).

Marsh, or Salt marsh, a pasture found to be particularly favourable to the recovery of sick and lame horses under certain circumstances. The experienced Gibson says, the salt marshes along the river Thames are as good pasture for horses as any about London; and there many horses run all the year round. Though the air arising from the marshes is very injurious to human constitutions, and subjects them to annual returns of the ague, and some other maladies; yet it has no such effect upon brute creatures that feed on them, which may perhaps be owing to the quality of the salts with which that grass is more or less impregnated. The marsh soil is for the most part a composition of a very fine light mould, mixed with sand, covered all over with a fine trefoil, which sows itself and grows extremely thick in some places, as we see it on some parts of our finest commons. If the rains fall never so heavy, the ground being open drinks it up immediately, so that the cattle always lie dry upon it, even in winter, when most other places are potchy, which is one of the greatest benefits of all others to horses at grass. They purge more there, both by dung and urine, than on any other pasture, and afterwards take on a firmer flesh; so that those who send their horses there only to cleanse them, and after purging remove them to other pastures, unless it be for some particular convenience, Gibson says, are greatly mistaken; for he has known horses that have run there summer and winter, with as few accidents as happen to horses any where else. Four-and-twenty hours' constant rain in the grass season will often bring up grass in the marshes, unless the weather be extremely cold. And horses often grow fat on the best marshes when they are eaten so bare, or burnt up in dry weather, that scarcely any grass is to be seen on them. In winter some never house them, but let them run abroad and take their chance in the open fields, where there are neither trees nor hedges to cover them, and yet they seldom suffer any thing from the extremity of the weather; nor, unless the ground be covered deep with snow, do they allow them any dry forage. Yet these for the most

part appear in good case even in the months December and January, when they have nothing to feed on but the roots.

All the water they have to drink is for the most part brackish, which at first is not very agreeable to horses that have not been used to it, but afterwards they relish it as well as any other. The greatest danger on the marsh grounds is from the deep ditches made to take off the spring tides, some of which have their bottoms filled with a mixed substance engendered by the weeds, which makes them still more dangerous.

MARSH (Narcissus), a learned prelate, was born in Wiltshire in 1638, and educated at Magdalen-hall, Oxford. In 1678 he was appointed provost of Dublin college, and in 1682 promoted to the bishopric of Leighlin and Ferns, and after various translations reached the archbishopric of Armagh in 1703. He repaired several decayed churches, and built an alms-house for clergymen's widows. He died in 1713. The archbishop wrote, 1. Institutiones Logicæ in usum Juventutis Academicæ, Dublin, 1681. 2. An Introduction to the Doctrine of Sounds, containing some Proposals for the Improvement of Acoustics, &c.

MARSH (Cinquefoil), in botany. See COMARUM.

MARSH (Elder), in botany. See VIBURNUM.

MARSH (Marigold). See CALTHA.

MARSHAL, or MARESCHAL, *marescallus*, primarily denotes an officer who has the care or the command of horses.

Nicod derives the word from *polemarchus*, master of the camp; Matthew Paris from *Martis senescallus*. In the old Gaulish language, *march* signified horse; whence *marechal* might signify him who commanded the cavalry. Spelman, Skinner, and Menage, derive it from the German *maer*, *marre*, a mare, or even a horse, and *schall*, servant; which makes some imagine the title was first given to farriers, or those who shod and bled horses; and that, in succession of time, it passed to those who commanded them. Pasquier makes four several derivations for the four several kinds of marshals in use among the French; viz. marshals of France, marshals de camp, marshals de logis, or quarter-masters, and farriers, who are also called by the name of marshals. The third he derives from *marche*, or *marchir*, to mark, limit; and the last from *maire*, master, and *chal*, horse.

*Earl Marshal of Scotland.*—His office was to command the cavalry, whereas the constable commanded the whole army. They seem, however, to have had a sort of joint command, as of old all orders were addressed "to our constable and marischal." The office of earl marischal has never been out of the noble family of Keith. It was reserved at the union; and when the heritable jurisdictions were bought it was in the crown, being forfeited by the rebellion of George Keith, earl marischal, in 1715.

*Earl Marshal of England* is the eighth great officer of state. This office, until it was made hereditary, always passed by grant from the king, and never was held by tenure or serjeanty (by any subject) as the offices of lord high steward and lord high constable were sometimes held. The title is personal, the office honorary and officiary. They were formerly styled lord marshal only, until king Richard II, June 20, 1397, granted letters patent to Thomas Mowbray, earl of Nottingham, and to the heirs male of his body lawfully begotten, by the name and style of earl marshal; and further, gave them power to bear in their hand a gold truncheon, enamelled with black at each end; having at the upper end of it the king's arms engraven thereon, and at the lower end his own arms.

King James I. was pleased, by letters patent, dated August 29th, 1622, to constitute Thomas Howard, earl of Arundel and Surrey, earl marshal for life; and the next year, the same king granted (with the advice of the privy-council) letters patent, wherein it was declared, that during the vacancy of the office of lord high constable of England, the earl marshal had the like jurisdiction in the court of chivalry as both constable and marshal jointly ever exercised. See CHIVALRY (Court of).

On the 19th of October 1672, king Charles II. was pleased to grant to Henry lord Howard, and the heirs-male of his body lawfully begotten, the office and dignity of earl marshal of England, with power to execute the same by deputy or deputies, in as full and ample a manner as the same was heretofore executed by Henry Howard, lord Maltravers, late earl of Arundel, Surrey, and Norfolk, grandfather to the said Henry lord Howard; or by Thomas Howard late duke of Norfolk, grandfather to the said Thomas Howard, late earl of Arundel, Surrey, and Norfolk; or by Thomas Howard duke of Norfolk, grandfather of the said Thomas Howard duke of Norfolk; or by John Mowbray duke of Norfolk, or any other earl marshal of England; with a pension of 20l. each year, payable out of the Hanaper office in chancery; and on default of the issue-male of the said Henry lord Howard, with limitation to the heirs-male lawfully begotten of the body of the said Thomas Howard, earl of Arundel, &c.; and on the default of such issue to descend in like manner to the heirs-male of Thomas late earl of Suffolk; and, on default of his issue-male, to the heirs-male of lord William Howard, late of Naworth in the county of Cumberland, youngest son to Henry Howard late duke of Norfolk; and on default of his issue-male, to Charles Howard earl of Nottingham, and the heirs-male of his body lawfully begotten.

*Field Marshal*, an office of high rank in the European armies. It was long, however, disused in the British army, but has lately been revived in the person of his royal highness the duke of York, the duke of Kent, and some other general officers.

*Knight Marshal*, or *Marshal of the King's House*, an English officer, whose business, ac-

cording to Fleta, is to execute the commands and decrees of the lord steward, and to have the custody of prisoners committed by the court of verge. Under him are six marshal's men, who are properly the king's bailiffs, and arrest in the verge of the court, when a warrant is backed by the board of green-cloth. The court where causes of this king, between man and man, are tried, is called the Marshalsea, and is under the knight marshal.

MARSHAL signifies farther, 1. The chief officer of arms (*Shakspeare*). 2. An officer who regulates combats in the lists (*Dryden*). 3. Any one who regulates rank or order at a feast, or any other assembly (*Spenser*). 4. A harbinger; a pursuivant (*Sidney*).

*To* MA'RSHAL. *v. a.* (from the noun.) 1. To arrange; to rank in order (*Glanville*). 2. To lead as a harbinger (*Shakspeare*).

MA'RSHALLER. *s.* (from *marshal.*) One that arranges; one that ranks in order (*Trapp*).

MARSHALL (Thomas), an English divine, was born in Leicestershire, about 1621, and bred at Lincoln college, Oxford, but when the university was taken possession of by the parliamentary visitors he went to Rotterdam. After the restoration he became fellow of his college, and took his degree of D.D. He was afterwards rector of Lincoln college, and appointed dean of Gloucester. He died in 1685. His works are, 1. Observationes in Evangeliorum Versiones perantiquas duas, Gothicas scilicet et Anglo Saxonicas; 2. An Explanation of the Catechism; 3. An Epistle prefixed to Dr. Hyde's Translation into the Malayan Language of the four Gospels, and the Acts of the Apostles.

MARSHALL (Nathanael), an English divine, at the beginning of the eighteenth century, who was chaplain to George II. and published, 1. The works of St. Cyprian, fol. 1717; 2. A Defence of our Constitution in Church and State, 1717, 8vo. His sermons were published by his widow in 1730, in 3 vols. 8vo.

MARSHALLIA, in botany, a genus of the syngenesia polygamia æqualis class and order. Generic character: calyx common, many-leaved, spreading; leaflets linear lanceolate, blunt, concave, almost equal, permanent; corolla compound, uniform, longer than the calyx; stamen filaments five, capillary; pistil germ ovate; pericarpium none; seeds solitary; receptacle chaffy.

MARSHALLING A COAT, in heraldry, is the disposal of several coats of arms belonging to distinct families, in one and the same escutcheon or shield, together with their ornaments, parts, and appurtenances.

MARSHALSEA COURT, is a court of record, originally instituted to hear and determine causes between the servants of the king's household, and others, within the verge; and has jurisdiction of things within the verge of the court, and of pleas of trespass, where either party is of the king's family, and of all other actions personal, wherein both parties are the king's servants; but the court has also power to try all personal actions, as debt, trespass, slander, trover, action on the case, &c. between party and party, within the liberty, which extends twelve miles about Whitehall. The judges of this court are the steward of the king's household, and knight-marshal for the time being; the steward of the court, or his deputy, is generally an eminent counsel. It can try all causes, and sits every week, so that judgment can be obtained in a fortnight or three weeks. It has jurisdiction of all debts above as well as below forty shillings. But if a cause of importance is brought in this court, it is frequently removed into the court of King's Bench, or Common Pleas, by an *habeas corpus cum causa*. This cannot be done unless the debt is above twenty pounds. The court would have a great deal of practice, on account of the expedition of it, if it were not confined by having only a fixed number of attorneys.

MA'RSHALSHIP. *s.* The office of a marshal.

MARSHAM (Sir John), a learned writer, was born in London in 1602, and educated first at Westminster school, and next at St. John's college, Oxford. He afterwards studied the law, and became one of the six clerks in chancery. In the civil wars he adhered to the royal party, and in 1660 was chosen member of parliament for Rochester. Charles II. conferred on him the honour of knighthood. He died in 1685. He is distinguished for his Diatriba Chronologica, or a Chronological Dissertation, wherein he examines successfully the principal difficulties which occur in the chronology of the Old Testament, 1649, 4to. He afterwards enlarged this work under the following title, Canon Chronicus, Ægyptiacus, Ebraicus, Græcus, & Disquisitiones, 1662, folio.

MARSHFIELD, a town in Gloucestershire, with a market on Tuesday; seated on the Coteswold Hills, 11 miles E. of Bristol, and 102 W. of London. Lon. 2. 15 W. Lat. 51. 30 N.

MARSHLAND, a marshy peninsula in the county of Norfolk, opposite to King's-Lynn, almost surrounded with the Ouse and other navigable rivers, and an arm of the sea. It seems formerly to have been recovered out of the ocean, from whose inundations it could never be altogether defended; and in sir Henry Spelman's time it suffered two general ones, viz. one from the salt-water, the other from the freshes; by the last of which the inhabitants suffered 42,000l. damage. It contains about 30,000 acres, which turn to more profit by grazing than ploughing. It is about ten miles in the widest place, and has no less than 111 brick bridges. The commonage of it belongs to seven villages that surround it. The air was formerly so unhealthy that an ague was in that country called the *Marshland bailiff*. Of late, however, this tract of land has been diligently cultivated, and there is a corresponding improvement in the salubrity of the air.

MARSHMALLOW. See ALTHÆA.

MA'RSHY. *a.* (from *marsh.*) 1. Boggy; wet; fenny; swampy (*Dryden*). 2. Produced in marshes (*Dryden*).

MARSI, a nation of Germany, who afterwards settled in Italy, in a country abounding with wild boars, and other ferocious animals. They are particularly celebrated for the civil war in which they were engaged, and which from them has received the name of the Marsian war.

MARSIGLI (Louis), an Italian, born in 1658, at Bologna. He entered into the imperial army, and served with great reputation; but in 1683 he was taken prisoner by the Tartars, who sold him to the Turks. After suffering much hardship, he was ransomed in 1684, and in 1689 obtained a colonel's commission. He was afterwards advanced to the rank of marshal, but when the count d'Arco was condemned to death for giving up the fortress of Brisac to the duke of Burgundy, Marsigli, who commanded him, was also disgraced, and dismissed the service. He now sought consolation in scientific pursuits, and returned to Bologna, where he formed a museum, and founded a printing-house; the first he gave to the senate, and the last to the Dominicans. He died at Marseilles in 1729. He was a fellow of the Royal Society of London, and member of the Academy of Sciences at Paris. His writings on philosophical subjects are numerous.

MARSI'LEA. In botany, a genus of the class cryptogamia, order musci. Common receptacle oval, coriaceous, many-celled, filled with numerous anthers, and germs. Two species; both exotics.

MARSTON (John), an English dramatic writer, who lived in the time of James I. Wood says he was a student in Corpus Christi college, Oxford; but we neither know his family nor the time of his birth. He contributed eight plays to the stage, which were all acted at Black-friars with applause; and one of them, called the Dutch Courtezan, was once revived since the restoration, under the title of the Revenge, or a Match in Newgate. There is no account when he died; but we find his works were published after his death by Shakspeare, and may thence reasonably conclude that it happened about the year 1614. He was a chaste and pure writer; avoiding all that obscenity, ribaldry, and scurrility, which too many of the dramatists of that time, and indeed much more so in some periods since, have made the basis of their wit, to the great disgrace and scandal of the stage.

MARSYAS, a celebrated piper of Celæne, in Phrygia. He was so skilful in playing on the flute that he is generally deemed the inventor of it. Marsyas was enamoured of Cybele, and he travelled with her as far as Nysa, where he had the imprudence to challenge Apollo to a trial of his skill as a musician. The god accepted the challenge, and it was mutually agreed that he who was defeated should be flead alive by the conqueror. Each exerted his utmost skill, and the victory, with much difficulty, was adjudged to Apollo. The god, upon this, tied his antagonist to a tree, and flead him alive. Marsyas is often represented on monuments as tied, his hands behind his back, to a tree, while Apollo stands before him with his lyre in his hands. At Celæne the skin of Marsyas was shown to travellers for some time; it was suspended in the public place in the form of a bladder or a foot-ball. (*Hygin. Ovid.* &c.)—2. A river of Phrygia, which, it is said, had its source from the abundant tears of the Fauns, Satyrs, and Druids, at the fall of Marsyas the musician.

MARSUPIAL. (*marsupialis.*) Shaped like a bag, or purse.

MARSUPIALIS, (*marsupialis, masculus*; from *marsupium*, a purse, so named from its resemblance.) In anatomy. See OBTURATOR INTERNUS.

MART, denotes a great fair or market, held annually for the buying and selling goods. There is a mart of this kind at Lynn every February, which lasts about a fortnight. This is followed by one at Wisbech, of nearly equal duration.

MARTABAN, a city of Asia, and capital of a country subject to the king of Ava, who took it from Pegu. It was a long time the capital of an independent kingdom. The soil is fertile, and the climate represented as healthy. This city was once a seaport, and one of the most flourishing commercial towns in the east, being situated on the side of a bay or large river near the Bay of Bengal, that afforded a good harbour for ships of the largest size; but after the king of Ava had conquered the country, he caused a number of vessels, laden with stones, to be sunk in its mouth, so that it is now only navigable for small vessels. The chief trade is now in earthenware and fish: 115 miles S.S.E. Pegu. Lon. 98. 2 E. Lat. 16. 38 N.

MARTAGON LILY, in botany. See LILIUM.

MARTEN, in ornithology. See HIRUNDO.

MARTHA, (St.) a province of Terra Firma, in South America, having the North Sea on the N. Rio de la Hache on the E. New Granada on the S. and Carthagena on the W. It is about 300 miles long, and 200 broad. Here the Cordillera de los Andes begin, which run the whole length of South America. This country, on the sea-coast, is exceedingly hot, but farther inland very cold, notwithstanding its situation within the torrid zone.

MARTHA, (St.) the capital of the above province, is situated in a wholesome air near the sea. Lon. 74. 0 W. Lat. 11. 27 N.

MARTHA, (St.) an exceeding high mountain of New Spain. According to some travellers it is about 100 miles in circumference at the base, near 5 miles high, and always covered with snow. Lon. 73. 55 W. Lat. 8. 0 N.

MARTHA'S VINEYARD, an island of North America near the coast of New-England, 80 miles south of Boston. The inhabitants apply themselves chiefly to their fisheries, in which they have great success. Lon. 70. 35 W. Lat. 41. 0 N.

MA'RTIAL. *a.* (*martial*, Fr. *martialis*, Lat.) 1. Warlike; fighting; given to war; brave (*Spenser. Chapman*). 2. Having a war-

like show; suiting war (*Pope*). 3. Belonging to war; not civil (*Bacon*). 4. Borrowing qualities from the planet Mars (*Brown*). 5. Having parts or properties of iron, which is called *Mars* by the chemists.

MARTIAL LAW, is the law of war that depends upon the just but arbitrary will and pleasure of the king, or his lieutenant: for though the king doth not make any laws but by common consent in parliament, yet, in time of war, by reason of the necessity of it to guard against dangers that often arise, he useth absolute power, so that his word is a law. (*Smith de Repub. Ang. lib.* 2. *c.* 4.) But the martial law, according to chief justice Hale, is in reality not a law, but something indulged rather than allowed as a law; and it relates only to members of the army, being never intended to be executed on others, who ought to be ordered and governed by the laws to which they are subject, though it be a time of war. And the exercise of martial law, whereby any person might lose his life, or member, or liberty, may not be permitted in time of peace, when the king's courts are open for all persons to receive justice.

MARTIALES LUDI, games celebrated at Rome in honour of Mars.

MARTIALIS (Marcus Valerius), a native of Spain, came to Rome about the 20th year of his age, where he recommended himself by his poetical genius. As he was the panegyrist of the emperors, he gained the greatest honours, and Domitian gave him the tribuneship; but unmindful of the favours he received after the death of his benefactor, he exposed the vices of a monster, whom, in his lifetime, he had extolled as the pattern of virtue. Trajan treated the poet with coldness, who, after he had passed 35 years in Rome in the greatest splendour, retired to his native country, where he became the object of malevolence and ridicule. He died about the 104th year of the Christian era, in the 75th year of his age. He is now well known by the fourteen books of epigrams which he wrote, and whose merit is now best described by the candid confession of the author in this line,

*Sunt bona, sunt quædam mediocria, sunt male plura.*

The Editio Princeps of Martial is supposed to have been printed about the year 1470. It is in 4to, and is a work of extreme scarcity and great price. Of the Aldine editions of 1510—17, the curious set a great value on the first, some very few copies of which were struck off on vellum. Radius's folio edition of 1602 is very valuable. The excellent edition of Scriverius, L. Bat. Duod. 1619. Amst. 1650, contains, besides the notes of that learned editor, those of Joseph Scaliger, Brodæus, Adrian Turnebus, Politian, Lipsius, Rutsgersius, and Pontanus. Smidsius's edition published in 8vo. at Amsterdam, in 1701, is very valuable. The last edition we have seen is the Bipont edit. of 1784, in 2 vols. 8vo. It is formed on Scriverius's, corrected by Schrevelius, and collated with those of Raderus and Farnabus. In the first volume there is a life of Martial by Raderus.

MA'RTIALIST. *s.* (from *martial.*) A warriour; a fighter (*Howel*).

MARTIN, or MARTLET, in mastiology. (See MUSTELA.) An animal inhabiting woods and bushy coverts, rather inferior in size to a domestic cat, but longer in the neck and body, having a head and tail corresponding in make and shape with the fox, but not so sharp-pointed in the ears. It is nearly as expert in climbing trees, and leaping from one to another, as a squirrel; breeds in the hollows of trees, and produces four, five, and even six, young at a time: lives upon poultry, game, and birds. These animals by their great agility in climbing become a most destructive enemy to pheasants, and by their scent they are frequently the subject of much mortifying disappointment to a field of expectant sportsmen. When found admist the bushes, the general burst of the finding hounds is as great as when a fox is unkenneled, and so continues, till, being closely pressed, some friendly tree (probably clothed with ivy) suddenly terminates the chase, by affording the martlet an asylum.

MARTIN, in ornithology. See HIRUNDO.

MARTIN (Benjamin), a very eminent artist and mathematician, was born in 1704. After publishing a variety of ingenious treatises, and particularly a scientific magazine under his own name, and carrying on for many years a very extensive trade as an optician and globemaker in Fleet-street, the growing infirmities of age compelled him to withdraw from the active part of business. Trusting too fatally to what he thought the integrity of others, he unfortunately, though with a capital more than sufficient to pay all his debts, became a bankrupt. The unhappy old man, in a moment of desperation from this unexpected stroke, attempted to destroy himself; and the wound, though not immediately mortal, hastened his death, which happened February 9th, 1782, in his 78th year. He had a valuable collection of fossils and curiosities of almost every species; which, after his death, were almost given away by public auction. His principal publications, as far as they have occurred to recollection, are, The Philosophic Grammar; being a View of the present State of Experimental Physiology, or Natural Philosophy, 1735, 8vo. A new, complete, and universal System or Body of Decimal Arithmetic, 1735, 8vo. The Young Student's Memorial Book, or Patent Library, 1735, 8vo. Description and Use of both the Globes, the Armillary Sphere and Orrery, Trigonometry, 1736, 2 vols. 8vo. Memoirs of the Academy of Paris, 1740, 5 vols. System of the Newtonian Philosophy, 1759, 3 vols. New Elements of Optics, 1759. Mathematical Institutions, viz. Arithmetic, Algebra, Geometry, and Fluxions, 1759. Natural History of England, with a Map of each County, 1759, 2 vols. Philology, and Philosophical Geography, 1759. Mathematical Institutions, 1764, 2 vols. Lives of Philosophers, their Inventions, &c. 1764. Introduction to the New-

tonian Philosophy, 1765. Institutions of Astronomical Calculations, 2 parts, 1765. Description and Use of the Air-Pump, 1766. Description of the Torricellian Barometer, 1766. Appendix to the Description and Use of the Globes, 1766. Philosophia Britannica, 1778, 3 vols. Gentleman and Lady's Philosophy, 3 vols. Miscellaneous Correspondence, 4 vols. System of Philology. Philosophical Geography. Magazine complete, 14 vols. Principles of Pump-work. Theory of the Hydrometer. Doctrine of Logarithms.

MARTIN (St.), a town of France, in the isle of Rhe, with a harbour and strong citadel, 15 miles west of Rochelle. Lon. 1. 17 W. Lat. 46. 10 N.

MARTIN (St.), one of the Leeward Caribean islands, in the West Indies, lying to the north-west of St. Bartholomew, and to the south-west of Anguilla. It is 24 miles in circumference, has neither harbour nor river, but several salt-pits. It was long jointly possessed by the French and Dutch; but at the commencement of the present war, the former were expelled by the latter. Lon. 63. 0 W. Lat. 18. 4 N.

MARTIN (Cape), a promontory of Valencia in Spain, near a town called Denia, and separates the Gulph of Valencia from that of Alicant.

MARTIN (Free), in zoology, is a name given in this country to a cow-calf cast at the same time with a bull-calf, which is a kind of hermaphrodite that is never known to breed nor to discover the least inclination for the bull, nor does the bull ever take the least notice of it. See HERMAPHRODITE.

MARTINGAL, in the manage, a thong of leather fastened at one end of the girths under the belly of a horse, and at the other end to the museroll to keep him from rearing.

MARTINI (Raymond), a learned orientalist of the 13th century. He was a native of Spain, and entered among the dominicans. He wrote a famous book against the Jews, called Pugio Fidei, which was not printed till 1651.

MARTINI (Martin), a jesuit, who resided many years in China, of which country he wrote many curious memoirs. He returned to Europe in 1651, and published a description of China, with a map of that empire. It is said that he went back thither, and died at Hang-Chew at the age of 74.

MARTINICO, one of the Windward Caribbee Islands, 60 miles in length, and 100 in circumference. The French possessed it from 1635 till 1762, when it was taken by the English; it was restored in 1763, and again taken by the English in 1794: but restored to France again by the treaty of peace in 1801. There are many high mountains covered with trees, as well as several rivers and fertile vallies, but they will not bear either wheat or vines; however, the former is not much wanted, for the natives prefer cassava to wheat bread. It produces sugar, cotton, ginger, indigo, chocolate, aloes, pimento, plantains, and other tropical fruits; and is extremely populous. In 1770 it contained 12,450 white people, 1814 free mulattoes, 70,553 slaves, and 443 fugitive negroes. About the same time, its products were computed at 23 million pounds of sugar, 600,000 of cotton, and 40,000 of cocoa. It has several safe and commodious harbours, well fortified. St. Pierre is the capital.

MA'RTINMAS. *s.* (*Martin* and *mass.*) The feast of St. Martin; the eleventh of November, commonly corrupted to *martilmas* or *martlemas* (*Tusser*).

MARTLETS, in heraldry, little birds represented without feet, and used as a difference or mark of distinction for younger brothers.

MARTNETS, in a ship, small lines fastened to the leech of a sail, reeved through a block on the topmast-head, and coming down by the mast to the deck. Their use is to bring the leech of the sail close to the yard to be furled.

MARTORANO, a town of Naples, in Calabria Citeriore, with a bishop's see, eight miles from the sea, and 15 S. of Cosenza. Lon. 16. 20 E. Lat. 39. 6 N.

MARTOREL, a town of Spain, in Catalonia, seated at the confluence of the Noya and Lobragal, 18 miles N.W. of Barcelona. Lon. 1. 56 E. Lat. 41. 36 N.

MARTOS, a town of Spain, in Andalusia, with a fortress on a rock, eight miles S. of Anduxar.

MARTYNIA, in botany, a genus of the class didynamia, order angiospermia. Calyx five-cleft; corol ringent; capsule woody, covered with a bark, with a hooked beak, four-celled, two-valved. Four species: three of South America; one of the Cape; herbaceous, flowering plants.

MARTYR, is one who lays down his life, or suffers death, for the sake of his religion. The word is Greek, μαρτυρ, and properly signifies a witness. It is applied, by way of eminence, to those who suffer in witness of the truth of the gospel.

The Christian church has abounded in martyrs, and history is filled with surprising accounts of their singular constancy and fortitude under the most cruel torments human nature was capable of suffering. The primitive Christians were accused by their enemies of paying a sort of divine worship to the martyrs. Of this we have an instance in the answer of the church of Smyrna to the suggestion of the Jews, who, at the martyrdom of Polycarp, desired the heathen judge not to suffer the Christians to carry off his body, lest they should leave their crucified master, and worship him in his stead. To which they answered, "We can neither forsake Christ, nor worship any other: for we worship him as the Son of God; but love the martyrs as the disciples and followers of the Lord, for the great affection they have shown to their king and master." A like answer was given at the martyrdom of Fructuosus in Spain. For when the judge asked Eulogius, his deacon, whether he would not worship Fructuosus? as thinking, that though he refused to worship the heathen idols, he might yet be inclined to worship a Christian martyr; Eulogius replied,

"I do not worship Fructuosus, but him whom Fructuosus worships." The primitive Christians believed, that the martyrs enjoyed very singular privileges; that upon their death they were immediately admitted to the beatific vision, while other souls waited for the completion of their happiness till the day of judgment; and that God would grant chiefly to their prayers the hastening of his kingdom, and shortening the times of persecution.

The churches built over the graves of the martyrs, and called by their names, in order to preserve the memory of their sufferings, were distinguished by the title *martyrium confessio*, or *memoria*.

The festivals of the martyrs are of very ancient date in the Christian church, and may be carried back at least till the time of Polycarp, who suffered martyrdom about the year of Christ 168. On these days the Christians met at the graves of the martyrs, and offered prayers and thanksgiving to God for the examples they had afforded them: they celebrated the eucharist, and gave alms to the poor; which, together with a panegyrical oration or sermon, and reading the acts of the martyrs, were the spiritual exercises of these anniversaries.

Martyr (Peter), a famous divine, was born at Florence in 1500. His family name was Vermillius, but his parents gave him that of Martyr, from one Peter, a martyr, whose church stood near their house. After receiving a private education he entered into an Augustine monastery at Fiesoli. He became distinguished as a preacher, and was appointed governor of St. Peter's in the altar at Naples, where the writings of some of the reformers brought him off from popery. He soon found it necessary to leave Italy, and went to Strasburg, where he married a young nun who had quitted her vows. From thence he went to England at the invitation of Edward VI. who made him professor of divinity at Oxford, and canon of Christ church. On the accession of queen Mary he was forced to leave the kingdom. He died at Zurich in 1562, aged 63. He wrote several books against the papists, and some Commentaries on the Sacred Scriptures. His wife died at Oxford, and in the reign of Mary her remains were taken up and buried in a dunghill, but when Elizabeth came to the throne they were honourably interred in Christ church, and an oration spoken on the occasion.

*To* Ma'rtyr. *v. a.* (from the noun.) 1. To put to death for virtue, or true profession. 2. To murder; to destroy (*Suckling*).

MA'RTYRDOM. *s.* (from *martyr.*) The death of a martyr; the honour of a martyr; testimony born to truth by voluntary submission to death (*Hooker*).

MARTYRO'LOGIST. *s.* (*martyrologiste*, French.) A writer of martyrology.

MARTYROLOGY, a catalogue or list of martyrs, including the history of their lives and sufferings for the sake of religion. The term comes from μαρτυρ witness, and λεγω *dico*, or λεγω *colligo*. The martyrologies draw their materials from the kalendars of particular churches, in which the several festivals dedicated to them are marked; and which seem to be derived from the practice of the ancient Romans, who inserted the names of heroes and great men in their fasti or public registers.

The martyrology of Eusebius of Cæsarea was the most celebrated in the ancient church. It was translated into Latin by St. Jerom; but the learned agree that it is not now extant. That attributed to Beda, in the eighth century, is of very doubtful authority; the names of several saints being there found who did not live till after the time of Beda. The ninth century was very fertile in martyrologies; then appeared that of Florus, subdeacon of the church at Lyons; who, however, only filled up the chasms in Beda. This was published about the year 830, and was followed by that of Waldenburtus, monk of the diocese of Treves, written in verse about the year 848, and this by that of Usuard, a French monk, and written by the command of Charles the Bald in 875, which last is the martyrology now ordinarily used in the Romish church. That of Rabanus Maurus is an improvement on Beda and Florus, written about the year 845: that of Notker, monk of St. Gal, was written about the year 894. The martyrology of Ado, monk of Ferrieres, in the diocese of Treves, afterwards archbishop of Vienne, is a descendant of the Roman; if we may so call it; for Du Sollier gives its genealogy thus: The martyrology of St. Jerom is the great Roman martyrology; from this was made the little Roman one printed by Rosweyd; of this little Roman martyrology was formed that of Beda, augmented by Florus. Ado compiled his in the year 858. The martyrology of Nevelon, monk of Corbie, written about the year 1089, is little more than an abridgment of that of Ado; father Kircher also makes mention of a Coptic martyrology preserved by the Maronites at Rome.

We have also several protestant martyrologies, containing the sufferings of the reformed under the papists; as an English martyrology by J. Fox, with others by Bray, Clarke, &c.

MARU, a town of Persia, in Chorasan, celebrated for its salt-works, 150 miles E.N.E. of Mesched, and 190 N.N.E. of Herat.

MARVAO, a town of Portugal, in Alentejo, seven miles S.E. of Valença de Alcantara. Lon. 6. 14 W. Lat. 44. 33 N.

MARVEJOLS, a commercial town of France, in the department of Lozere, seated in a valley, on the river Colange, 10 miles N.W. of Mende, and 300 S. of Paris. Lon. 2. 23 E. Lat. 44. 36 N.

MA'RVEL. *s.* (*merveille*, Fr.) A wonder; any thing astonishing (*Shakspeare*).

Marvel of Peru. See Mirabilis.

*To* Ma'rvel. *v. n.* (*merveiller*, Fr.) To wonder; to be astonished: disused (*Shaks*).

MARVELL (Andrew), an ingenious writer in the 17th century, was bred at Cambridge. He travelled through the most polite parts of Europe, and was secretary to the embassy at Constantinople. His first appearance in public business at home was as assistant to Mr.

John Milton, Latin secretary to the protector. A little before the restoration, he was chosen by his native town, Kingston upon Hull, to sit in that parliament, which began at Westminster April 25th, 1660; and is recorded as the last member of parliament who received the wages or allowance anciently paid to representatives by their constituents. He seldom spoke in parliament, but he had great influence without doors upon the members of both houses; and prince Rupert had always the greatest regard for his advice. He made himself very obnoxious to the government by his actions and writings; notwithstanding which, king Charles II. took great delight in his conversation, and tried all means to win him over to his side, but in vain, nothing being ever able to shake his resolution. There were many instances of his firmness in resisting the offers of the court; but he was proof against all temptations. The king having one night entertained him, sent the lord-treasurer Danby the next morning to find out his lodgings; which were then up two pair of stairs in one of the little courts in the Strand. He was busy writing when the treasurer opened the door abruptly upon him. Surprised at the sight of so unexpected a visitor, Mr. Marvell told his lordship, "That he believed he had mistaken his way." Lord Danby replied, "Not, now I have found Mr. Marvell;" telling him he came from his majesty, to know what he could do to serve him. Coming to a serious explanation, he told the lord-treasurer, that he knew the nature of courts full well; that whoever is distinguished by a prince's favour is certainly expected to vote in his interest. The lord Danby told him, that his majesty had only a just sense of his merits, in regard to which he only desired to know if there was any place at court he could be pleased with. These offers, though urged with the greatest earnestness, had no effect upon him. He told the lord-treasurer that he could not accept of them with honour; for he must be either ungrateful to the king in voting against him, or false to his country in giving into the measures of the court. The only favour therefore he had to request of his majesty was, that he would esteem him as dutiful a subject as any he had, and more in his proper interest by refusing his offers, than if he had embraced them. The lord Danby finding no arguments could prevail, told him that the king had ordered a thousand pounds for him, which he hoped he would receive till he could think what farther to ask of his majesty. The last offer was rejected with the same stedfastness of mind as the first; though, as soon as the lord-treasurer was gone, he was forced to send to a friend to borrow a guinea. He died, not without strong suspicions of his being poisoned, in 1678, in the 58th year of his age. In 1688 the town of Kingston upon Hull contributed a sum of money to erect a monument over him in the church of St. Giles in the Fields, where he was interred, and an epitaph composed by an able hand; but the ministry of that church forbid both the inscription and monument to be placed there. He wrote many ingenious pieces; as, The Rehearsal transprosed; A short Historical Essay concerning General Councils, Creeds, and Impositions in matters of Religion, &c. also Poems, and Letters.

MA'RVELLOUS. *a.* (*mervellieux*, Fr.) 1. Wonderful; strange; astonishing (*Shaks.*). 2. Surpassing credit (*Pope*). 3. *The marvellous*, is any thing exceeding natural power, opposite to *the probable.*

MA'RVELLOUSLY. *ad.* Wonderfully; strangely (*Clarendon*).

MA'RVELLOUSNESS. *s.* Wonderfulness; strangeness; astonishingness.

MARUM, in botany, a provincial name applied to one or two species of satureia, melissa, and origanum.

MARY STUART, queen of France and Scotland, was the daughter of James V. of Scotland, and Mary de Guise, the daughter of Claude I. of Lorrain, duke of Guise. She succeeded her father when eight years of age, and was carried into France during the civil wars which broke out in Scotland, where she was educated at the court of Henry II. and on the 24th of April, 1558, married the dauphin, on which they both assumed the title of king and queen of Scotland, England, and Ireland, and quartered their arms accordingly. Queen Elizabeth caused her ambassador in France to complain of this usurpation, but without effect: and therefore considered Mary as a dangerous rival. The dauphin was crowned king of France on the death of his father, by the name of Francis II. but died soon after; on which Mary quitted the title of queen of England, and returned into Scotland, where she married her cousin Henry Stuart, lord Darnly, and caused him to be styled king of Scotland. She at first shewed great fondness for him, but afterwards rendered him jealous by her familiarity with her favourite Rizzio, an Italian fiddler. On which the earl of Morton, and some others, wounded Rizzio in the queen's presence, when she was advanced about five months in her pregnancy, and then drawing Rizzio into another room, they completed the murder. The earl of Bothwell soon after became her favourite, and while he appeared with a royal magnificence, and was loaded with favours, she treated her husband with indifference, and the greatest indignities. The king was soon after murdered, as it is said by the earl of Bothwell, who a few months after married the queen, having first divorced his wife, and afterwards treated the queen with great brutality. The disturbances in Scotland now obliged queen Mary to seek for protection in England, while her young son James was crowned king of Scotland. Mary, however, was imprisoned by order of Elizabeth, and after being confined eighteen years, was beheaded at Fotheringay for a conspiracy, on the 18th of February, 1587, in the forty-third year of her age. She was interred in the cathedral church of Peterborough; but when her son James came to the English crown, her remains were removed to Westminster abbey. Queen Elizabeth has

been greatly blamed for her severity towards Mary. This unhappy princess was extremely beautiful and accomplished.

MARY, queen of England, daughter of king Henry VIII. and Catherine of Arragon, was born on the 18th of February, 1515. On her father's marrying Anne Boleyne, she was declared illegitimate. After the death of Edward VI. in 1553, lady Jane Grey was proclaimed queen of England, but Mary promising that no change should be made in religion, obtained the crown, and some time after, lady Jane, with the lord Dudley, and other persons of quality, were beheaded. Soon after Mary's accession to the throne, she married Philip II. afterwards king of Spain, son of the emperor Charles V. who was then living, and in violation of the most sacred promises, began a dreadful persecution of the Protestants, which was carried on by Bonner, bishop of London, and Gardiner, bishop of Winchester. Great numbers of persons suffered martyrdom at the stake; among which were Cranmer, Ridley, Latimer, Hooper, and Ferrer; and all the prisons in the kingdom were crowded with those pious sufferers, who submitted to persecution rather than violate their consciences. Even the princess Elizabeth was closely watched, and obliged to conceal her religious sentiments. Amidst these dreadful proceedings, Mary was far from being happy; a continual disagreement with her husband, who was younger than she, and of whom she was passionately fond, with the loss of Calais, which was taken by the French, threw her into a complication of distempers, of which she died without issue, the 17th of November, 1558, in the forty-fourth year of her age, after a bloody reign of five years, four months, and eleven days, and was succeeded by Elizabeth.

MARY II. queen of England, was the eldest daughter of James II. king of England, by his first wife the lady Anne Hyde, and was born at St. James's the 10th of May, 1662. On the 15th of November, 1677, she married William-Henry of Nassau; went into Holland with her husband, who was made stadtholder of the United Provinces, and staid there till 1689, when after the abdication of king James, she returned to England, and on the 11th of April was crowned queen, and her husband king of England, by the name of William III. She endeared herself to the people by the wisdom of her conduct, and during the absence of king William, had the administration of affairs, which she conducted very ably. She died of the small-pox at Kensington palace, Dec. 28th, 1694.

MARY MAGDALEN'S DAY, a festival of the Romish church, observed annually on the 22d of July.

MARY LE BONE. See MARIBONE.

MARYBOROUGH, a borough of Ireland, capital of Queen's County, 17 miles south of Philipstown. Lon. 7. 0 W. Lat. 53. 2 N.

MARYGOLD, in botany. See CALENDULA.

MARYGOLD (Corn). See CHRYSANTHEMUM.

MARYGOLD (French). See TAYGETES.

MARYLAND, one of the United States of America, 134 miles long and 110 broad; bounded on the N. by Pennsylvania, on the E. by the state of Delaware, on the S.E. and S. by the Atlantic ocean, and on the S. and W. by Virginia. It is divided into 18 counties, 10 of which are on the western, and eight on the eastern shore of the Chesapeak. The number of inhabitants is about 320,000, of whom 103,000 are slaves. Wheat and tobacco are the staple commodities of this state, which, in most respects, resembles Virginia. Anapolis is the capital.

MARY'S RIVER (St.), a river of the United States, in Georgia. It is navigable for vessels of considerable burden for ninety miles; and its banks afford immense quantities of fine timber suited to the West India markets. It forms a part of the southern boundary of the United States, and enters Amelia Sound, in lat. 30. 44 N.

MARY'S STRAIT (St.), a strait in North America, which forms the communication between lake Superior and lake Huron. It is about 40 miles long; and at the upper end is a rapid fall, which, when conducted by careful pilots, may be descended without danger.

MARYPORT, a seaport of Cumberland, with a harbour capable of great improvement. In 1750 it was only a poor fishing town; but it has now upward of 3000 inhabitants, who employ about 90 vessels, from 50 to 250 tons burden, in the coal or coasting trade. It is situate at the mouth of the Ellen, on the coast of the Irish sea, nine miles N.W. of Cockermouth. Lon. 3. 32 W. Lat. 54. 45 N.

MARZA SIROCCO, a gulf on the S. side of the isle of Malta. The Turks landed here in 1565, when they went to besiege Valetta; for which reason the grand master ordered three forts to be built, two at the entrance of the gulf, and one on the point of land that advances into the middle of it.

MARZILLA, a town of Spain, in the province of Navarre, seated near the river Arragon, 30 miles S. of Pampeluna.

MAS PLANTA. See MASCULINE FLOWER.

MASAFUERO, an island in the S. Pacific Ocean, about 90 miles W. of Juan Fernandez. It is very high and mountainous, and at a distance appears like one hill or rock. It is of a triangular form, and about 25 miles in circumference. Lon. 80. 46 W. Lat. 33. 45 S.

MASARIS, in entomology, a Fabrician tribe of the genus VESPA, which see.

MASBATE, one of the Philippine islands, almost in the centre of the rest. It is 75 miles in circumference, and the natives are tributary to the Spaniards. Lon. 122. 25 E. Lat. 11. 36 N.

MASBOTHÆI, or MESBOTHÆI, the name of a sect, or rather of two sects; for Eusebius, or rather Hegesippus whom he cites, makes mention of two different sects of Masbothæans. The first was one of the seven sects

that arose out of Judaism, and proved very troublesome to the church; the other was one of the seven Jewish sects before the coming of Jesus Christ. The word is derived from the Hebrew שבת, *schabat*, to rest or repose, and signifies idle, easy, indolent people. Eusebius speaks of them as if they had been so called from one Masbothæus, their chief: but it is much more probable that their name is Hebrew, or at least Chaldaic, signifying the same thing with a Sabbatarian in our language; that is, one who makes profession of keeping sabbath. Valesius will not allow the two sects to be confounded together: the last being a sect of Jews before, or at least contempary with Christ: and the former a sect of heretics descended from them. Rufinus distinguishes them in their names: the Jewish sect he calls Masbuthæi; and the heretics Masbuthæani. The Masbuthæans were a branch of the Simonians.

MASBROUGH, a village in Yorkshire, on the river Don, adjoining the bridge of Rotherham. Here are considerable iron works, where all sorts of hammered and cast iron goods are made, from the most trifling article to a large cannon, of which great quantities are exported.

MASCATE, a town of Arabia Felix, in the province of Oman. It has a castle on a rock, and is very strong both by nature and art, though the buildings are mean. It was fortified, in 1650, by the Portuguese; but afterwards taken by the Arabs, who put all the garrison to the sword, except eighteen, who turned Mahometans. The cathedral, built by the Portuguese, is now the king's palace. There are neither trees, shrubs, nor grass to be seen on the seacoast near it, and only a few date-trees in a valley at the back of the town, though they have all things in plenty. The weather is so hot from May to September, that no people are to be seen in the streets from ten in the morning till four in the afternoon. The bazars or market-places are covered with the leaves of date-trees, laid on beams which reach from the house tops on one side to those on the other. The religion of the inhabitants is Mahometanism, and yet, contrary to the custom of the Turks, they suffer any one to go into their mosques. The products of the country are horses, dates, fine brimstone, coffee, and ruinoss, a root that dyes red. Mascate is seated at the bottom of a small bay of the Arabian sea, 68 miles S.E. of Oman. Lon. 57. 26 E. Lat. 24. 0 N.

MASCHARADA. A term applied by the Italians to music composed for the gestures of mimics, buffoons, and grotesque characters.

MA'SCULINE. *a.* (*musculin*, Fr.). 1. Male; not female (*Milton*). 2. Resembling man; virile; not soft; not effeminate (*Add.*). 3. (In grammar.) It denotes the gender appropriated to the male kind in any word.

MASCULINE FLOWER. (*masculus flos*). In botany, a male or barren flower.

MA'SCULINELY. *ad.* Like a man (*B. Jonson*).

MA'SCULINENESS. *s.* (from *masculine*.) Mannishness; male figure or behaviour.

MASH. *s.* (*masche*, Dutch.) 1. The space between two threads of a net; commonly written mesh (*Mortimer*). 2. (from *mischen*, Dutch, or *mascher*, Fr.). Any thing mingled or beaten together into an undistinguished or confused body.

MASH, a kind of diet-pudding sometimes given to a horse. It is made of half a peck of ground malt, put into a pail, into which as much scalding water is poured as will wet it very well. When that is done, stir it about till by tasting you find it as sweet as honey; and when it has stood till it is luke-warm, it is to be given to the horse. This is mostly used after a purge, to make it work the better; or after hard labour; or in the time of sickness. Mashes are made with bran in the same manner. Taplin recommends two thirds of the former, to one of the latter.

*To* MASH. *v. a.* (*mascher*, French.) 1. To beat into a confused mass (*More*). 2. To mix malt and water together in brewing (*Mortimer.*)

MASHANGUR, a town of Hindustan Proper, in the province of Cabul, situate on the Seward, 48 miles N. of Attock, and 130 E.S.E. of Cabul. Lon. 71. 7 E. Lat. 33. 54 N.

MASINISSA, a king of a small part of Africa, who assisted the Carthaginians in their wars against Rome. He proved a most indefatigable and courageous ally, but an act of generosity rendered him amicable to the interests of Rome. After the defeat of Asdrubal, Scipio found, among the prisoners, one of the nephews of Masinissa. He sent him back to his uncle loaded with presents, and conducted him with a detachment for the safety and protection of his person. Masinissa was struck with this generous action, he forgot all former hostilities, and joined his troops to those of Scipio. This change of sentiments was not the effect of a wavering or unsettled mind, but Masinissa shewed himself the most attached and the firmest ally the Romans ever had. He afterwards rendered many services to the Romans, and his fidelity was at length rewarded with the kingdom of Syphax, and some of the Carthaginian territories. Masinissa died in the 97th year of his age, after a reign of above 60 years, 149 years before the Christian era. He left 54 sons, three of whom were legitimate, Micipsa, Gulussa, and Manastabal. The kingdom was fairly divided among them by Scipio, whom he had appointed as their guardian, and the illegitimate children received, as their portion, very valuable presents. The death of Gulussa and Manastabal soon after left Micipsa sole master of the large possessions of Masinissa.

MASK. *s.* (*masque*, French.) 1. A cover to disguise the face; a visor. (See MASQUE.) 2. Any pretence or subterfuge (*Prior*). 3. A festive entertainment in which the company is masked (*Shakspeare*). 4. A revel; a piece of mummery (*Milton*). 5. A dramatic performance, written in a tragic style, without attention to rules or probability (*Peacham*).

MASK. An utensil called by the Latins

*persona*, from the verb *personare*, to sound through; and which was used by the ancient Roman actors and singers. It was generally formed with a wide mouth in the shape of a shell, for the purpose of augmenting the power of the voice, upon the principle of the speaking trumpet.

*To* MASK. *v. a.* (*masquer*, French.) 1. To disguise with a mask or visor (*Hooker*). 2. To cover; to hide (*Crashaw*).

*To* MASK. *v. n.* 1. To revel; to play the mummer (*Prior*). 2. To be disguised any way.

MASKED CORAL, in botany. See PERSONATE.

MASKELYNE'S ISLES, a group of small beautiful islands, in the South Pacific ocean, lying off the S.E. point of Malicollo, one of the New Hebrides.

MA'SKER. *s.* (from *mask.*) One who revels in a mask; a mummer (*Donne*).

MA'SLIN. *a.* (corrupted from *miscellane.*) Composed of various kinds.

MASLACH. A medicine of the opiate kind, in use amongst the Turks.

MASON, a person employed under the direction of an architect, in the raising of a stone-building. The chief business of a mason is to make the mortar; raise the walls from the foundation to the top, with the necessary retreats and perpendiculars; to form the vaults, and employ the stones as delivered to him. When the stones are large, the business of hewing or cutting them belongs to the stone-cutters, though these are frequently confounded with masons: the ornaments of sculpture are performed by carvers in stones or sculptors. The tools or implements principally used by them are the square, level, plumb-line, bevel, compass, hammer, chissel, mallet, saw, trowel, &c. (See SQUARE, &c.) Besides the common instruments used in the hand, they have likewise machines for raising of great burdens, and the conducting of large stones: the principal of which are the lever, pulley, wheel, crane, &c. (See LEVER, &c.)

MASONS (Free and Accepted), a very ancient society or body of men: so called, either from some extraordinary knowledge of masonry or building, which they are supposed to be masters of, or because the first founders of the society were persons of that profession. These are now very considerable, both for number and character, being found in every country in Europe, and consisting principally of persons of merit and consideration. As to antiquity, they lay claim to a standing of some thousand years. What the end of their institution is, seems still in some measure a secret; and they are said to be admitted into the fraternity by being put in possession of a great number of secrets, called the *mason's word*, which have been religiously kept from age to age, being never divulged. See FREE-MASONRY.

MASON (William), an eminent poet and distinguished scholar, was born at Hull, where his father possessed the vicarage of St. Trinity. Where he received his school education we have not been able to learn. At the proper time he was admitted into St. John's college, Cambridge; where he took the degree of B. A. and M. A., and in 1747 he obtained a fellowship in Pembroke-hall. It was there that he contracted an intimate friendship with Gray the poet, and with Mr. Hurd, now bishop of Worcester. When the former of these gentlemen died, Mr. Mason took upon himself the office of editor of his works and guardian of his fame; and upon the promotion of the latter to the see of Lichfield and Coventry, he expressed his satisfaction in some beautiful verses.

In 1754 he entered into holy orders, and was patronised by the then earl of Holderness, who obtained for him the appointment of chaplain to the king, and presented him with the valuable rectory of Aston in Yorkshire. He was some time afterwards made precentor of York cathedral, when he published a small volume of church music, which has alternately met with opposition and applause. In our opinion some of his anthems are unrivalled.

It was natural for the precentor of a cathedral church, who was likewise a poet, to turn his attention to sacred music; and Mason had been a poet from his early years. His Elfrida and Caractacus, two tragedies on the Grecian model, were both published before the year 1757. These two dramas, in the opinion of Dr. Hurd, do honour to modern poetry, and are, according to him, a sufficient proof of the propriety of reviving the chorus on the British stage. In this sentiment few critics, we believe, will agree with his lordship; but the tragedies have certainly great merit, and transcend perhaps every poem of the same cast in our own or any other modern tongue. In the first, the language is elegant and sweet; in the latter, it is daring and sublime. The author himself always considered the former as the most perfect; and Johnson, whose critical judgment will not be rashly questioned, seems to have been of the same opinion.

Besides his two tragedies, Mr. Mason published many other poems. His English Garden is universally read and admired, being unquestionably the finest poem of the kind that has appeared since the days of Thomson; though some have affected to consider it as treating the subject rather with professional skill than with poetical genius. That there are in it a few prosaic expressions we shall not controvert; for such seem inseparable from didactic poetry: but, taken as a whole, where shall we find its equal? His elegies, particularly that on the death of his wife, and that on the demise of lady Coventry, have been generally read and extolled, though not more than they deserve, as superior in classical elegance to any thing of the kind in the English tongue, and expressing a manliness and tenderness of the pathetic, rarely found in the most polished elegies of Roman writers. The splendour of genius, and accuracy of judgment, conspicuous in his dramas, are equally displayed in his character as a lyric writer. His quarry was bold and impetuous, and he never swept the ground with an ignominious flight. In his Sappho

and Phaon he has happily imitated the style of Dryden and Metastasio; and at his death he was employed on a poem in which he proposed to measure his strength with Dryden.

It is said, we know not how truly, that this ingenious man was the inventor of the fashionable instrument the piano-forte.

Poetry and music, and the duties of his office, might be supposed to have employed all his time; but he caught the alarm which in 1769 was spread over the nation by the expulsion of Mr. Wilkes from the House of Commons, and immediately enrolled himself among the supporters of the Bill of Rights.

Being leagued with the opposition, he joined in the application for a parliamentary reform. In the year 1779, when the city of London, and some other commercial towns, agreed to present their petition to parliament for a more economical expenditure of the public money, and a more equal representation of the people, Mr. Mason came forward and took an active part in promoting these designs, as one who was convinced of their importance and necessity. Yet he shewed, by his subsequent conduct, that however earnestly he might wish for what he doubtless considered as an expedient reform in the commons-house of Parliament, he was firmly attached to the British constitution. He was indeed a whig; but he was a whig of the old school: and thus, like many others of the same principles, became alarmed at the dreadful encroachments made upon real liberty in the progress of the French revolution.

The death of this great and good man, which happened in April 1797, was occasioned neither by age nor by inveterate disease. As he was stepping into his chariot his foot slipped, and his shin grazed against the step. This accident had taken place several days before he paid the proper attention to it; and on April the 3d a mortification ensued, which in the space of 48 hours put a period to his life.

MASONRY, in general, a branch of architecture, consisting in the art of hewing or squaring stones, and cutting them level or perpendicular, for the uses of building: but in a more limited sense, masonry is the art of assembling and joining stones together with mortar.

MASONRY (Free), denotes the system of mysteries and secrets peculiar to the society of free and accepted masons. The origin of this society is very ancient; but we have no authentic account of the time when it was first instituted, or even what was the reason of such an association of people under the title of Masons, more than of any other mechanical profession. In Dr. Henry's history we find the origin of the Free Mason's Society in Britain attributed to the difficulty found in former times of procuring a sufficient number of workmen to build the multitude of churches, monasteries, and other religious edifices which the superstition of those ages prompted the people to raise. Hence the masons were greatly favoured by the popes, and many indulgences were granted in order to augment their numbers. In times like those we speak of, it may well be supposed that such encouragement from the supreme pastors of the church must have been productive of the most beneficial effects to the fraternity; and hence the increase of the society may naturally be deduced. The doctor quotes, in confirmation of this, the words of an author who was well acquainted with their history and constitution. "The Italians (says he), with some Greek refugees, and with them French, Germans, and Flemings, joined into a fraternity of architects, procuring papal bulls for their encouragement and their particular privileges; they styled themselves Freemasons, and ranged from one nation to another, as they found churches to be built: their government was regular; and where they fixed near the building in hand they made a camp of huts. A surveyor governed in chief; every tenth man was called a warden and overlooked each nine. The gentlemen in the neighbourhood, either out of charity or commutation of penance, gave the materials and carriages. Those who have seen the accounts in records of the charge of the fabrics of some of our cathedrals near 400 years old, cannot but have a great esteem for their economy, and admire how soon they erected such lofty structures."

By other accounts, however, the antiquity of masonry is carried up much higher, even as early as the building of Solomon's temple. In Britain the introduction of masonry has been fixed at the year 674, when glass-making was first introduced; and it appears indeed, that from this time many buildings in the Gothic style were erected by men in companies, who are said to have called themselves free, because they were at liberty to work in any part of the kingdom. Others have derived the institution of freemasons from a combination among the people of that profession not to work without an advance of wages, when they were summoned from several counties, by writs of Edward III. directed to the sheriffs, to assist in rebuilding and enlarging the castle, together with the church and chapel of St. George, at Windsor. At this time, it is said, the masons agreed on certain tokens by which they might know and assist each other against being impressed, and not to work unless free and on their own terms.

In the Supplement to the Encyclopædia Britannica, we have the following account of the origin of Freemasonry. "Much falsehood is current respecting the origin and antiquity of the masonic associations. That the Dionysiacs of Asia Minor were a society of architects and engineers, who had the exclusive privilege of building temples, stadia, and theatres, under the mysterious tutelage of Bacchus, seems to be unquestionable. We are also certain that there was a similar trading association during the dark ages in Christian Europe, which monopolized the building of great churches and castles, and enjoyed many privileges under the patronage of the various sovereigns. Circumstances (says Dr. Robison), which it would be

tedious to enumerate and discuss, continued this association longer in Britain than on the continent; but there is no good evidence that, anterior to the year 1648, any man sought admission into it, who was not either a builder by profession, or at least skilled in the science of architecture. At that period, indeed, Mr. Ashmole, the famous antiquary, was admitted into a lodge at Warrington, together with his father-in-law colonel Mainwaring: and these are the first distinct and unequivocal instances that we have in Britain of men unconnected with the operative masons being received into their mysterious fraternity. The secrecy, however, of the lodges, made them fit places for the meetings of the royalists; and accordingly many royalists became freemasons. Nay, the ritual of the master's degree seems to have been formed, or perhaps twisted from its original institution, so as to give an opportunity of sounding the political principles of the candidate, and of the whole brethren present. For it bears so easy an adaptation to the death of the king, to the overturning of the venerable constitution of the English government of three orders by a mean democracy, and its re-establishment by the efforts of the loyalists, that this would start into every person's mind during the ceremonial, and could hardly fail to shew, by the countenances and behaviour of the brethren, how they were affected.

"This supposition receives much countenance from the well known fact that Charles II. was made a mason, and frequented the lodges. It is not unlikely, that besides the amusement of a vacant hour, which was always agreeable to him, he had pleasure in meeting with his loyal friends, and in the occupations of the lodge, which recalled to his mind their attachment and services. His brother and successor James II. was of a more serious and manly cast of mind, and had little pleasure in the frivolous ceremonies of masonry. He did not frequent the lodges. But, by this time, they were the resort of many persons who were not of the profession, or members of the trading corporation. This circumstance, in all probability, produced the denominations of free and accepted masons. A person who has the privilege of working at any incorporated trade is said to be a freeman of that trade. Others were accepted as brethren, and admitted to a kind of honorary freedom; as is the case in many other trades and incorporations, without having (as far as we can learn for certain) a legal title to earn a livelihood by the exercise of it.

"It was not till some years after this period that the lodges made open profession of the cultivation of general benevolence, and that the grand aim of the fraternity was to enforce the exercise of all the social virtues. The establishment of a fund for the relief of unfortunate brethren did not take place till the very end of the last century; and we may presume that it was brought about by the warm recommendations of some benevolent members, who would naturally enforce it by addresses to their assembled brethren. Hence the probable origin of those philanthropic discourses which are occasionally delivered in the lodges by one of the brethren as an official task.

"The boasted philanthropy of masons serves, however, another purpose. The inquisitive are always prying and teazing, eager to discover the secrets of their neighbours; and hence the brethren are induced to say, that universal beneficence is the great aim of the order, for it is the only point on which they are at liberty to speak. They forget that universal beneficence and philanthropy are inconsistent with the exclusive and monopolizing spirit of an association, which not only confines its benevolence to its own members (like any other charitable association), but hoards up in its bosom inestimable secrets, whose natural tendency, they say, is to form the heart to this generous and kind conduct, and inspire us with love to all mankind. The profane world cannot see the beneficence of concealing from public view a principle or a motive which so powerfully induces a mason to be good and kind. The brother says, that publicity would rob it of its force; and we must take him at his word: and our curiosity is so much the more excited, to learn what are the secrets which have so singular a quality, for they must be totally unlike the principles of science, which produce their effects only when made public.

"From this account of masonry, it would appear to have been at first a loyal association, and as such it was carried over from England to the continent; for all the masons abroad profess to have received their mysteries from Great Britain. It was first transported into France by the zealous adherents of king James, who, together with their unfortunate master, took refuge in that country; and it was cultivated by the French in a manner suited to the taste and habits of that highly polished and frivolous people. To the three simple British degrees of apprentice, fellow-craft, and master, they gradually added degrees innumerable, all decorated with stars and ribbons; and into their lodges they introduced the impieties and seditious doctrines of Voltaire and the other philosophists." The English freemasons, however, as a body, are perfectly free from the charge of promulgating either seditious or irreligious opinions.

MASORA, a term in the Jewish theology, signifying a work on the Bible, performed by several learned rabbins, to secure it from any alterations which might otherwise happen.

Their work regards merely the letter of the Hebrew text; in which they have, first, fixed the true reading by vowels and accents: they have, secondly, numbered not only the chapters and sections, but the verses, words, and letters of the text: and they find in the Pentateuch 5245 verses, and in the whole Bible 23,206. The masora is called, by the Jews, the hedge or fence of the law, because this enumeration of the verses, &c. is a means of preserving it from being corrupted and altered. They have, thirdly, marked whatever irregu-

larities occur in any of the letters of the Hebrew text; such as the different size of the letters, their various positions and inversions, &c. and they have been fruitful in finding out reasons for these irregularities and mysteries in them. (See CABBALISTS). They are, fourthly, supposed to be the authors of the Keri and Chetibh, or the marginal corrections of the text in our Hebrew Bibles.

There is a great and a little masora printed at Venice and at Basil, with the Hebrew text in a different character. Buxtorf has written a masoretic commentary, which he calls Tiberias. See on this subject Jennings's Jewish Ant. vol. i. p. 400, &c. and the various authors there cited.

MASORITES, Jewish doctors, authors of the Masora. According to Elias Levita, they were the Jews of a famous school at Tiberias, about 500 years after Christ, who composed, or at least began the masora; whence they are called masorites, and masoretic doctors. Aben Ezra makes them the authors of the points and accents in the Hebrew text, as we now find it; and which serve for vowels. See POINTS.

The age of the masorites has been much disputed. Archbishop Usher places them before Jerom; Capel at the end of the fifth century; father Morin in the tenth century: Basnage says, that they were not a society, but a succession of men; and that the masora is the work of many grammarians, who, without associating and communicating their notions, composed this collection of criticisms on the Hebrew text. It is urged that there were masorites from the time of Ezra and the men of the great synagogue, to about the year of Christ 1030; and that Ben Asher and Ben Naphtali, who were the best of the profession, and who, according to Basnage, were the inventors of the masora, flourished at this time.—Each of these published a copy of the whole Hebrew text, as correct, says Dr. Prideaux, as they could make it. The eastern Jews have followed that of Ben Naphtali, and the western that of Ben Asher; and all that has been done since is to copy after them, without making any more corrections or masoretical criticisms.

MASOVIA, a province of Poland, containing the two Palatinates of Czerk or Masovia Proper, and Polotsk. By the dismemberment of this kingdom it was annexed to Prussia. Warsaw is the chief city.

MASQUE, or MASK, a cover for the face, contrived with apertures for the eyes and mouth; originally worn chiefly by women of condition, either to preserve their complexion from the weather, or out of modesty to prevent their being known. Poppæa, wife of Nero, is said to be the first inventor of the masque; which she did to guard her complexion from the sun and weather, as being the most delicate woman, with regard to her person, that has been known. Theatrical masques were in common use both among the Greeks and Romans: Suidas and Athenæus ascribe the invention of them to the poet Choerilus, a contemporary of Thespis; Horace attributes them to Æschylus; but Aristotle informs us that the real inventor, and consequently the time of their first introduction and use, were unknown. Brantome observes, that the common use of modern masques was not introduced till towards the end of the 16th century.

MASQUE. A musical drama chiefly consisting of singing, machinery, and dancing. Masques, which preceded the regular or legitimate drama, required such splendid and expensive decorations, that they were necessarily at first confined to the palaces of princes, and the mansions of the nobility. Those of Ben Jonson, Beaumont and Fletcher, sir William Davenant, Milton, and others, originally appeared in that manner, and seem, indeed, to have been written for particular occasions.

MASQUE is also used to signify any thing made use of to cover the face, and prevent a person's being known. The penitents of Lyons and Avignon hide their faces with large white veils, which serve them for masques.

The IRON MASQUE (*Masque de Fer*), or Man with the iron masque, a remarkable personage so denominated, who existed as a state prisoner in France during the latter part of the last century. As the circumstances of this person form a historical problem which has occasioned much inquiry, and given rise to many conjectures, as well as of late, in consequence of the destruction of the Bastile, excited in a particular manner the curiosity of the public, it shall be endeavoured to condense in this article the substance of every thing material that has been published on the subject. We shall first relate such particulars concerning this extraordinary prisoner as appear to be well authenticated; and shall afterwards mention the different opinions and conjectures that have been entertained with regard to his real quality, and the causes of his confinement.

I. The authenticated particulars concerning the Iron Masque are as follows:—A few months after the death of cardinal Mazarine, there arrived at the isle of Sainte Marguerite, in the sea of Provence, a young prisoner whose appearance was peculiarly attracting: his person was above the middle size, and elegantly formed; his mien and deportment were noble, and his manners graceful; and even the sound of his voice, it is said, had in it something uncommonly interesting. On the road he constantly wore a mask made with iron springs, to enable him to eat without taking it off. It was at first believed that this masque was made entirely with iron; whence he acquired the name of "the Man with the iron mask." His attendants had received orders to dispatch him if he attempted to take off his masque or discover himself. He had been first confined at Pigneol, under the care of the governor M. de St. Mars; and upon being sent from thence to St. Marguerite, he was accompanied thither by the same person, who continued to have the charge of him. He was always treated with the most marked respect: he was served constantly in plate; and the governor himself placed his dishes on the table, retiring immediately after,

and locking the door behind him. He *tutoyoit* (thee'd and thou'd) the governor; who, on the other hand, behaved to him in the most respectful manner, and never wore his hat before him, nor sat down in his presence unless he was desired. The Marquis de Louvoisis, who went to see him at St. Marguerite, spoke to him standing, and with that kind of attention which denotes high respect.

During his residence here, he attempted twice, in an indirect manner, to make himself known. One day he wrote something with his knife on a plate, and threw it out of his window towards a boat that was drawn on shore near the foot of the tower. A fisherman picked it up and carried it to the governor. M de St. Mars was alarmed at the sight; and asked the man with great anxiety, whether he could read, and whether any one else had seen the plate? The man answered, that he could not read, that he had but just found the plate, and that no one else had seen it. He was, however, confined till the governor was well assured of the truth of his assertions.—Another attempt to discover himself proved equally unsuccessful. A young man who lived in the isle one day perceived something floating under the prisoner's window; and on picking it up, he discovered it to be a very fine shirt written all over. He carried it immediately to the governor; who, having looked at some parts of the writing, asked the lad, with some appearance of anxiety, if he had not had the curiosity to read it? He protested repeatedly that he had not: but two days afterwards he was found dead in his bed.

The Masque de Fer remained in this isle till the year 1698, when M. St. Mars being promoted to the government of the Bastile, conducted his prisoner to that fortress. In his way thither, he stopt with him at his estate near Palteau. The Masque arrived there in a litter, surrounded by a numerous guard on horseback. M. de St. Mars eat at the same table with him all the time they resided at Palteau: but the latter was always placed with his back towards the windows; and the peasants, who came to pay their complements to their master, and whom curiosity kept constantly on the watch, observed that M. de Mars always sat opposite to him with two pistols by the side of his plate. They were waited on by one servant only, who brought in and carried out the dishes, always carefully shutting the door both in going out and returning. The prisoner was always masked, even when he passed through the court; but the people saw his teeth and lips, and also observed that his hair was grey. The governor slept in the same room with him, in a second bed that was placed in it on that occasion. In the course of their journey, the iron mask was, one day, heard to ask his keeper whether the king had any design on his life? "No, Prince," he replied; "provided that you quietly allow yourself to be conducted, your life is perfectly secure."

The stranger was accommodated as well as it was possible to be in the Bastile. An apartment had been prepared for him by order of the governor before his arrival, fitted up in the most convenient style; and every thing he expressed a desire for was instantly procured him. His table was the best that could be provided; and he was ordered to be supplied with as rich clothes as he desired: but his chief taste in this last particular was for lace, and for linen remarkably fine. It appears that he was allowed the use of such books as he desired, and that he spent much of his time in reading. He also amused himself with playing upon the guitar. He had the liberty of going to mass; but was then strictly forbid to speak or uncover his face: orders were even given to the soldiers to fire upon him if he attempted either; and their pieces were always pointed towards him as he passed through the court. When he had occasion to see a surgeon or a physician, he was obliged, under pain of death, constantly to wear his mask. An old physician of the Bastile, who had often attended him when he was indisposed, said, that he never saw his face, though he had frequently examined his tongue, and different parts of his body; that there was something uncommonly interesting in the sound of his voice; and that he never complained of his confinement, nor let fall from him any hint by which it might be guessed who he was. It is said that he often passed the night in walking up and down his room.

This unfortunate prince died on the 19th of November 1703, after a short illness; and was interred next day in the burying-place of the parish of St. Paul. The expence of his funeral amounted only to forty livres. The name given him was *Marchiali*: and even his age, as well as his real name, it seemed of importance to conceal; for in the register made of his funeral, it was mentioned that he was about forty years old; though he had told his apothecary, some time before his death, that he thought he must be sixty. It is a well known fact, that immediately after the prisoner's death, his apparel, linen, clothes, matresses, and in short every thing that had been used by him, were burnt; that the walls of his room were scraped, the floor taken up, evidently from the apprehension that he might have found means of writing any thing that would have discovered who he was. Nay such was the fear of his having left a letter or any mark which might lead to a discovery, that his plate was melted down; the glass was taken out of the window of his room, and pounded to dust; the window-frame and doors burnt; and the ceiling of the room, and the plaster of the inside of the chimney, taken down. Several persons have affirmed, that the body was buried without a head; and M. de St. Foix informs us, that "a gentleman having bribed the sexton, had the body taken up in the night, and found a stone instead of the head."

The result of these extraordinary accounts is, that the Iron Masque was not only a person of high birth, but must have been of great con-

sequence; and that his being concealed was of the utmost importance to the king and ministry.

Various are the conjectures and opinions that have been formed respecting the real name and condition of this remarkable personage. Some have pretended that he was the duke of Beaufort; others, that he was the count de Vermandois, natural son to Louis XIV. by the duchess de la Valliere. Some maintain him to have been the duke of Monmouth, natural son of Charles II. of England by Lucy Walters; and others say, that he was Gerolami Magni, minister to the duke of Modena.

Besides these conjectures, none of which possesses sufficient probability to entitle them to consideration, a fifth has been advanced: namely, That the Iron Masque was a son of Anne of Austria, queen to Louis XIII. and consequently that he was a brother of Louis XIV.; but whether a bastard brother, a brother-german, or a half brother, is a question which has not yet been decided. And as the difficulty of the enquiry increases with the lapse of time, it is probable the doubts which hang about this mysterious subject will never be removed.

MASQUERADE, or MASCARADE, an assembly of persons masqued or disguised, meeting to dance and divert themselves. This was much in use with us, and has been long a very common practice abroad, especially in carnival time. The word comes from the Italian *mascarata*, and that from the Arabic *mascara*, which signifies raillery, buffoonery. Granacci, who died in 1543, is said to have been the first inventor of masquerades.

*To* MASQUERA'DE. *v. n.* (from the noun.) 1. To go in disguise (*L'Estrange*). 2. To assemble in masks (*Swift*).

MASQUERA'DER. *s.* (from *masquerade.*) A person in a mask (*L'Estrange*).

MASRAKITHA, a pneumatic instrument of music among the ancient Hebrews, composed of pipes of various sizes, fitted into a kind of wooden chest, open at the top, and stopped at the bottom with wood covered with a skin. Wind was conveyed to it from the lips, by means of a pipe fixed to the chest: the pipes were of lengths musically proportioned to each other, and the melody was varied at pleasure, by stopping and unstopping with the fingers the apertures at the upper extremity.

MASS. *s.* (*masse*, French; *massa*, Latin.) 1. A body; a lump; a continuous quantity (*Newton*). 2. A large quantity (*Davies*). 3. Bulk; vast body (*Abbot*). 4. Congeries; assemblage indistinct (*Dryden*). 5. Gross body; the general (*Dryden*).

*To* MASS. *v. n.* (from the noun.) To celebrate mass (*Hooker*).

MASS, in mechanics, the matter of any body cohering with it, *i. e.* moving and gravitating along with it. In which sense mass is distinguished from bulk, or volume, which is the expansion of a body in length, breadth, and thickness. The mass of any body is rightly estimated by its weight. And the masses of two bodies of the same weight are in a reciprocal ratio of their bulks.

MASS, *Missa*, in the church of Rome, the office or prayers used at the celebration of the eucharist; or in other words consecrating the bread and wine into the body and blood of Christ, and offering them so transubstantiated as an expiatory sacrifice for the quick and the dead.

As the mass is in general believed to be a representation of the passion of our blessed Saviour, so every action of the priest, and every particular part of the service, is supposed to allude to the particular circumstances of his passion and death.

Nicod, after Baronius, observes that the word comes from the Hebrew *missach*, (*oblatum*;) or from the Latin *missa missorum*; because in the former times the catechumens and excommunicated were sent out of the church when the deacons said, *Ite, missa est*, after sermon and reading of the epistle and gospel; they not being allowed to assist at the consecration. Menage derives the word from *missio*, dismissing: others from *missa*, missing, sending; because in the mass, the prayers of men on earth are sent up to heaven.

The general division of masses consists in high and low. The first is that sung by the choristers, and celebrated with the assistance of a deacon and sub-deacon: low masses are those in which the prayers are barely rehearsed without singing.

There are a great number of different or occasional masses in the Romish church, many of which have nothing peculiar but the name: such are the masses of the saints; that of St. Mary of the snow, celebrated on the fifth of August; that of St. Margaret, patroness of lying-in women; that of the feast of St. John the Baptist, at which are said three masses; that of the Innocents, at which the gloria in excelsis and the hallelujah are omitted, and it being a day of mourning the altar is of a violet-colour. As to ordinary masses, some are said for the dead, and, as is supposed, contribute to fetch the soul out of purgatory: at these masses the altar is put in mourning, and the only decorations are a cross in the middle of six yellow wax lights; the dress of the celebrant, and the very mass-book, are black; many parts of the office are omitted, and the people are dismissed without the benediction.

MASSA. (*massa*, μαζα; from μασσω, to blend together). In medicine, a term generally applied to the compound out of which pills are to be formed.

MASSA CARNEA JACOBI SYLVII. In anatomy. See FLEXOR LONGUS DIGITORUM PEDIS.

MASSA, an ancient and strong town of Italy, the capital of a district of the same name, which is famous for its quarries of fine marble. It is 55 miles W. by N. of Florence. Lat. 44. 0 N. Lon. 10. 0 E.

**Massa**, an episcopal town of the Siennese, in Italy, 25 miles S. W. of Sierra. Lat. 42 40 N. Lon. 10. 48 E.

**Massa**, an episcopal town of Terra di Lavoro, in Naples, Italy. It is 20 miles. S. of Naples. Lat. 40. 31 N. Lon. 14. 18 E.

MASSACHUSETTS, one of the United States of America, bounded on the north by the states of Vermont and New Hampshire, on the east by the Atlantic, on the south by the Atlantic and the states of Connecticut and Rhode Island, and on the west by the state of New York; about 120 miles from east to west, and about forty-five, in general, from north to south, though towards the eastern extremity it is much more. Massachusetts was originally a part of New England, and first separated in the year 1627. In Massachusetts are to be found all the varieties of soil, from very good to very bad, capable of yielding all the different productions common to the climate, such as Indian corn, wheat, rye, barley, oats, hemp, flax, hops, potatoes, field beans and peas; apples, pears, peaches, plums, cherries, &c. Iron ore in immense quantities is found in various parts of this state, as likewise copper ore, black lead, pipe-maker's clay, yellow and red ochre, alum, slate, or stone, ruddle, or a red earth, and in some places asbestos, or incombustible cotton. Several mineral springs have been found in different parts of the country. Massachusetts is divided into eleven counties, which contain 265 towns, the principal of which are Boston and Salem. The number of inhabitants, in the year 1790, was 378,787; they are now upwards of 400,000. This state owns more than three times as many tons of shipping as any other of the states, and more than one-third part of the whole that belongs to the United States. At this period 35,000 tons are employed in carrying on the fisheries; 56,000 in the coasting business, and 120,560 in trading with almost all parts of the world. Pot and pearl-ashes, staves, flax, seed, bees-wax, &c. are carried chiefly to Great Britain, in remittance for their manufactures; masts and provisions to the East Indies; fish, oil, beef, pork, lumber, candles, &c. are carried to the West Indies, for their produce; and the two first articles, fish and oil, to France, Spain, and Portugal; roots, vegetables, fruits, and small meats, to Nova Scotia and New Brunswick; hats, saddlery, cabinet-work, men's and women's shoes, nails, tow, cloth, barley, hops, butter, cheese, &c. to the southern states. The negro-trade was prohibited by law in 1778, and there is not a single slave belonging to the commonwealth.

**Massachusetts Bay**, a bay of North America, which spreads eastward of Boston, and is comprehended between Cape Ann on the north, and Cape Cod on the south. It is so denominated, as well as the whole state, from a tribe of Indians of the same name that formerly inhabited the country round the bay.

MA'SSACRE. (*massacre*, French.) 1. Butchery; indiscriminate destruction (*Dryden*). 2. Murder (*Shakspeare*).

*To* Ma'ssacre. *v. a.* (*massacrer*, French.) To butcher; to slaughter indiscriminately (*Atterbury*).

MASSAFRA, an episcopal town of Naples, in Italy. Lat. 40. 50 N. Lon. 17. 20 E.

MASSAGETÆ, an ancient people, about whose seat there is as much doubt as about that of the Amazons: Tibullus and Ammion place them near Albania, beyond the Araxes, which sometimes denotes the Oxus: it is probable they dwelt to the east of Sogdiana. (*Dionysius Perigetes, Herodotus, Arrian*).

MASSALIANS, a set of enthusiasts who sprang up about the year 361, in the reign of the emperor Constantius, who maintained that men have two souls, a celestial and a diabolical, and that the latter is driven out by prayer.

MASSETER. (*masseter*, μασσητηρ; from μασσαομαι, to chew, because it assists in chewing.) A muscle of the lower jaw, situated on the side of the face. It is a short thick muscle, which arises, by fleshy and tendinous fibres, from the lower edge of the malar process of the maxillary bone, the lower horizontal edge of the os malæ, and the lower edge of the zygomatic process of the temporal bone, as far backwards as the eminence belonging to the articulation of the lower jaw. From some little interruption in the fibres of this muscle, at their origin, some writers describe it as arising by two, and others by three distinct portions, or heads. The two layers of fibres of which it seems to be composed cross each other as they descend, the external layer extending backwards, and the internal one slanting forwards. It is inserted into the basis of the coronoid process, and into all that part of the lower jaw which supports the coronoid and condyloid processes. Its use is to raise the lower jaw, and, by means of the above mentioned decussation, to move it a little forwards and backwards in the act of chewing.

MASSICOT. See Masticot.

MASSILIA, in ancient geography, a town of Gallia Narbonensis, a colony of Phoceans, from Phocæa, a city of Ionia, and in confederacy with the Romans, universally celebrated, not only for its port, commerce, and strength, but especially for its politeness of manners, and for its learning. According to Strabo, it was the school for barbarians, who were excited by its means to a fondness for Greek literature, so that even their public and private transactions were all executed in that language. Strabo adds, "At this day the noblest Romans repair thither for study rather than to Athens." Now Marseilles.

MASSILLON (Jean Baptiste), son of a notary at Hieres in Provence, was born in 1663, and entered into the congregation of the Oratory in 1681. He gained the affections of every person in the towns to which he was sent, by the charms of his genius, the liveliness of his character, and by a fund of the most delicate and affecting politeness. His first attempts in the art of eloquence were made at

Vienne, while he was professor of theology. His funeral oration on Henry de Villars, archbishop of that city, received universal approbation. This success induced father de la Tour, who was at that time general of the congregation, to call him to Paris. Here the superiority of his eloquence was clearly perceived when he appeared at court. Upon preaching his first advent sermon at Versailles, he received this eulogium from the mouth of Louis XIV. "Father, when I hear others preach, I am very well pleased with them; but whenever I hear you I am dissatified with myself." The first time he preached his famous sermon "on the small number of the elect," the whole audience were, at a certain place of it, seized with a sudden and violent emotion, and almost every person half rose from his seat, by a kind of involuntary movement.

In 1704 Massillon made his second appearance at court, and displayed still more eloquence than before. Louis XIV. after expressing his satisfaction to him, added, in the most gracious tone of voice, *Et je veux, mon pere, vous entendre tous les deux ans*. These flattering encomiums did not lessen his modesty. When one of his fellows was congratulating him upon his preaching admirably, according to custom, "Oh! give over, father (replied he), the devil has told me so already, much more eloquently than you."

Massillon was admitted into the French academy a year afterwards, in 1719. The abbacy of Savigny becoming vacant, the cardinal du Bois, to whom he had been weak enough to give an attestation for being a priest, procured it for him. The funeral oration of the duchess of Orleans, in 1723, was the last discourse he pronounced in Paris. He never afterwards left his diocese, where his gentleness, politeness, and kindness, had gained him the affection of all who knew him. He reduced the exorbitant rights of the episcopal roll to moderate sums. In two years he caused 20,000 livres to be privately conveyed to the Hotel Dieu of Clermont. His peaceable disposition was never more displayed than while he was a bishop. He took great pleasure in collecting the fathers of the Oratory and the Jesuits at his country-house, and in making them join in some diversion. He died on the 28th of September 1742, at the age of 79.

An excellent edition of Massillon's works was published by his nephew at Paris in 1745 and 1746, in 14 vols. large 12mo. and 12 vols. of a small size.—Among them we find, 1. Complete sets of sermons for Advent and Lent. It is particularly in his moral discourses, such as are almost all those of his sermons for Advent and Lent, that Massillon's genius appears. He excels, says M. d'Alembert, in that species of eloquence which alone may be preferred to all others, which goes directly to the heart, and which agitates without wounding the soul. He searches the inmost recesses of the heart, and lays open the secret workings of the passions, with so delicate and tender a hand, that we are hurried along rather than overcome. His diction, which is always easy, elegant, and pure, every where partakes of that noble simplicity, without which there can be neither good taste nor true eloquence; and this simplicity is, in Massillon, joined to the most attractive and the sweetest harmony, from which it likewise borrows new graces. In short, to complete the charm produced by this enchanting style, we perceive that these beauties are perfectly natural; that they flow easily from this source, and that they have occasioned no labour to the composer. There even occur sometimes in the expressions, in the turns, or in the affecting melody of the style, instances of negligence which may be called happy, because they completely remove every appearance of labour. By thus abandoning himself to the natural current of thought and expression, Massillon gained as many friends as hearers. He knew that the more anxious an orator appears to raise admiration, he will find those who hear him the less disposed to bestow it. 2. Several funeral orations, discourses, and panegyrics, which had never been published. 3. Ten discourses, known by the name of Petit Careme. 4. The Conferences Ecclesiastiques, which he delivered in the seminary of St. Magloire upon his arrival at Paris; those which he delivered to the curates of his diocese; and the discourses which he pronounced at the head of the synods which he assembled every year. 5. Paraphrases on several of the Psalms. A translation of several of Massillon's sermons was published in 1803, in 3 vols. 12mo. by Mr. W. Dickson.

A circumstance recorded by D'Alembert proves how dear the memory of Massillon was, not only to the poor whose tears he wiped away, and whose wants he removed, but to all who knew him. Some years after the prelate died, a traveller passing through Clermont wished to see the country-house in which he used to spend the greatest part of the year, and he applied to an old vicar, who, since the death of the bishop, had never ventured to return to that country-house, where he who had inhabited it was no longer to be found. He consented, however, to gratify the desire of the traveller, notwithstanding the profound grief he expected to suffer in revisiting a place so dear to his remembrance. They accordingly set out together, and the vicar pointed out every particular place to the stranger. "There," said he, with tears in his eyes, "is the alley in which the excellent prelate used to walk with us; there is the arbour in which he used to sit and read; this is the garden he took pleasure in cultivating with his own hands." Then they entered the house, and when they came to the room where Massillon died, "This," said the vicar, "is the place where we lost him:" and as he pronounced these words he fainted. The ashes of Titus, or of Marcus Aurelius, might have envied such a tribute of regard and affection.

MA'SSINESS. MA'SSIVENESS. *s.* (from *massy*, *massive*.) Weight; bulk; ponderousness (*Hakewill*).

MASSINGER (Philip), an English dramatic writer, was born at Salisbury in 1585, and was educated at Oxford, but left the university without taking a degree, and devoted himself wholly to the muses. He published fourteen plays of his own, and some in which he was assisted by others. His works have been reprinted in 1761, in four vols. 8vo. and in 1779, and lately by W. Gifford, esq. He died in 1639.

MA'SSIVE. MA'SSY. *a.* (*massif*, Fr.) Heavy; weighty; ponderous; bulky; continuous (*Dryden*).

MASSON (Papirius), a French writer, born in 1544. He entered among the Jesuits, but afterwards left the society, and became a lawyer. He died in 1611. Masson wrote four books of Annals, in Latin, 1598, 4to. and several other works.

MASSON (John), a French protestant divine, who died in Holland, whither he had fled on the revocation of the edict of Nantes. His works are, 1. Histoire Critique de la Republique des Lettres, fifteen vols. 12mo.; 2. Vitæ Horatii Ovidii et Plinii junioris; 3. Histoire de Pierre Bayle et de ses Ouvrages, Amst. 1716, 12mo.

MASSONIA, in botany, a genus of the class hexandria, order monogynia. Corol inferior with a six-parted border; filaments inserted in the neck of the tube; capsule three-winged, three-celled, many-seeded. Four species; bulbous rooted plants of the Cape.

MASSOY CORTEX. See CORTEX.

MASSUAH, or MATSUAH, a small island in the Red Sea, near the coast of Abyssinia, with an excellent harbour, and water deep enough for ships of any size to the very edge of the island: here they may ride in the utmost security, from whatever point, or with whatever degree of strength, the wind blows. As it takes its modern, so it received its ancient name from its harbour; it was called by the Greeks Sebasticum Os, from the capacity of its port, which is distributed into three divisions. The island itself is very small, scarcely three quarters of a mile in length, and about half that in breadth, one-third occupied by houses, one by cisterns to receive the rain-water, and the last is reserved for burying the dead. Lon. 56. 58 E. Lat. 15. 42 N.

MAST. *s.* (*mast*, *mat*, Fr. mæꞅꞇ, Saxon.) 1. The beam or post raised above the vessel, to which the sail is fixed (*Dryden*). 2. The fruit of the oak and beech. It has in this sense no plural termination (*Bacon*).

MAST, a long round piece of timber, elevated perpendicularly upon the keel of a ship, upon which are attached the yards, the sails, and the rigging, in order to their receiving the wind necessary for navigation. A mast, according to its length, is either formed of one single piece, which is called a pole-mast, or composed of several pieces joined together, each of which retains the name of mast separately. A top-mast is raised at the head or top of the lower-mast, through a cap, and supported by the trestle-trees. It is composed of two strong bars of timber, supported by two prominences, which are as shoulders on the opposite sides of the masts, a little under its upper end; athwart these bars are fixed the cross-trees, upon which the frame of the top is supported. Between the lower mast-head and the foremost of the cross-trees a square space remains vacant, the sides of which are bounded by the two trestle-trees. Perpendicularly above this is the foremost hole in the cap, whose after-hole is solidly fixed on the head of the lower-mast. The top-mast is erected by a tackle, whose effort is communicated from the head of the lower-mast to the foot of the top-mast, and the upper end of the latter is accordingly guided into and conveyed up through the holes between the trestle-trees and the cap, as before mentioned; the machinery by which it is elevated, or, according to the sea-phrase, swayed up, is fixed in the following manner. The top-rope, passing through a block which is hooked on one side of the cap, and afterwards through a hole, furnished with a sheave or pulley on the lower end of the top-mast, is again brought upwards on the other side of the mast, where it is at length fastened to an eye-bolt in the cap, which is always on the side opposite to the top-block. To the lower end of the top-rope is fixed the top-tackle, the effort of which being transmitted to the top-rope, and thence to the heel of the top-mast, necessarily lifts the latter upwards parallel to the lower mast. When the top-mast is raised to its proper height, the lower end of it becomes firmly wedged in the square hole (above described) between the trestle-trees. A bar of wood or iron, called the fid, is then thrust through a hole in the heel of it, across the trestle-trees, by which the whole weight of the top-mast is supported. See SHIPBUILDING.

Mr. George Smart, of Ordnance wharf, Westminster, obtained a patent in the year 1800, for framing masts, yards, bowsprits, &c. hollow, so as to combine lightness with strength. The idea of this gentleman, though not new, as is well known to those who are conversant with the theory of the strength and stress of materials, is certainly ingenious, and will, we hope, be duly encouraged.

MA'STED. *a.* (from *mast.*) Furnished with masts.

MA'STER. *s.* (*meester*, Dutch; *maistre*, Fr.) 1. One who has servants: opposed to man or servant (*Shakspeare*). 2. A director; a governour (*Ecclus*). 3. Owner; proprietor (*Dryden*). 4. A lord; a ruler (*Guardian*). 5. Chief; head (*Shakspeare*). 6. Possessor (*Addison*). 7. Commander of a trading ship (*Ascham*). 8. One uncontrolled (*Shakspeare*). 9. An appellation of respect (*Shakspeare*). 10. A young gentleman (*Dryden*). 11. One who teaches; a teacher (*South*). 12. A man eminently skilful in practice or science (*Davies*). 13. A title of dignity in the universities: as, *master* of arts.

*To* MA'STER. *v. a.* (from the noun.) 1. To be a master to; to rule; to govern (*Shakspeare*). 2. To conquer; to overpower (*Calamy*). 3. To execute with skill (*Bacon*).

MASTER AND SERVANT, a relation founded in convenience, whereby a man is directed to call in the assistance of others, where his own skill and labour will not be sufficient to answer the cares incumbent upon him. For the several sorts of servants, and how that character is created or destroyed, see the article SERVANT. Where a servant is hired for one year certain, and so from year to year as long as both parties shall agree, and the servant enters upon a second year, he must serve out that year, and is not merely a servant at will after the first year. If a woman-servant marries she must nevertheless serve out her term; and her husband cannot take her out of her master's service.

If a servant is disabled in his master's service by an injury received through another's default, the master may recover damages for loss of his service. And also a master may not only maintain an action against any one who entices away his servant, but also against the servant; and if without any enticement a servant leaves his master without just cause, an action will lie against another who retains him with a knowledge of such departure.

A master has a just right to expect and exact fidelity and obedience in all his lawful commands; and to enforce this he may correct his servant in a reasonable manner, but this correction must be to enforce the just and lawful commands of the master.

In defence of his master a servant may justify assaulting another; and though death should ensue it is not murder, in case of any unlawful attack upon his master's person or property.

Acts of the servant are, in many instances, deemed acts of the master; for as it is by indulgence of law that he can delegate the power of acting for him to another, it is just he should answer for such substitute, and that his acts being pursuant to the authority given him should be deemed the acts of his master. 4 Bac. Abr. 583. If a servant commits an act of trespass by command or encouragement of his master, the master will be answerable; but in so doing his servant is not excused, as he is bound to obey the master in such things only as are honest and lawful.

If a servant of an innkeeper robs his master's guest, the master is bound to make good the loss. Also, if a waiter at an inn sells a man bad wine, by which his health is impaired, an action will go against the master: for his permitting him to sell it to any person is deemed and implied general command. 1 Black. 430. In like manner if a servant is frequently permitted to do a thing by the tacit consent of his master, the master will be liable, as such permission is equivalent to a general command.

If a servant is usually sent upon trust with any tradesman, and he takes goods in the name of his master upon his own account, the master must pay for them: and so likewise if he is sent sometimes on trust, and other times with money: for it is not possible for the tradesman to know when he comes by the order of his master, and when by his own authority, or when with and without money. 1 Str 506. But if a man usually deals with his tradesmen himself, or constantly pays them ready money, he is not answerable for what his servant may take up in his name; for in this case there is not, as in the other, any implied order to trust him. Or if the master never had any personal dealings with the tradesman, but the contracts have always been between the servant and the tradesman, and the master has regularly given his servant money for payment of every thing had on his account, the master shall not be charged. Esp. N. P. 115. Or if a person forbids his tradesmen to trust his servant on his account, and he continues to purchase upon credit, he is not liable. The act of a servant, though he has quitted his master's service, has been held to be binding upon the master, by reason of the former credit given him on his master's account, and it not being known to the party trusting that he was discharged. 4 Bac. Abr. 586.

The master is also answerable for any injury arising by the fault or neglect of his servant when executing his master's business, 6 T. R. 659: but if there is no neglect or default in the servant the master is not liable. Esp. Rep. 533.

If a smith's servant lames a horse whilst shoeing him, or the servant of a surgeon makes a wound worse, in both these cases an action for damages will lie against the master, and not against the servant. But the damage must be done while the servant is actually employed in his master's service, otherwise he is liable to answer for his own misbehaviour or neglect.

A master is likewise chargeable if his servant casts any dirt, &c. out of the house into the common street; and so for any other nuisance occasioned by his servants, to the damage or annoyance of any individual, or the common nuisance of his majesty's people. Lord Raym. 264.

A servant is not answerable to his master for any loss which may happen without his wilful neglect; but if he is guilty of fraud or gross negligence an action will lie against him by his master.

A master is not liable in trespass for the wilful act of his servant; as by driving his master's carriage against another, done without the direction or assent of his master, no person being in the carriage when the act was done. But he is liable to answer for any damage arising to another from the negligence or unskilfulness of his servant acting in his employ. M'Manus v. Crickitt, Mich. 41 G. III.

MASTER OF ARTS, is the first degree taken up in foreign universities, and for the most part in those of Scotland, but the se-

cond in Oxford and Cambridge; candidates not being admitted to it till they have studied seven years in the university.

Master-attendant, is an officer in the royal dock-yards, appointed to hasten and assist at the fitting out or dismantling, removing, or securing vessels of war, &c. at the port where he resides. He is particularly to observe that his majesty's ships are securely moored, and for this purpose he is expected frequently to review the moorings which are sunk in the harbour, and observe that they are kept in proper order. It is also his duty to visit all the ships in ordinary, and see that they are frequently cleaned and kept in order; and to attend at the general musters in the dock-yards, taking care that all the officers, artificers, and labourers, registered at the navy-books, are present at their duty.

Master of the ceremonies, is an officer instituted by king James I. for the more solemn and honourable reception of ambassadors, and strangers of quality, whom he introduces into the presence. The badge of this office is a gold chain and medal, having on one side an emblem of peace, with king James's motto; and on the reverse the emblem of war, with *Dieu et mon droit*. He is always supposed to be a person of good address, and a master of languages, and has an appointment of 300l. a year: he is constantly attending at court, and hath under him an assistant-master, or deputy, at 6s. 8d. a day, who holds his place during the king's pleasure.

Master in chancery. The masters in chancery are assistants to the lord chancellor and master of the rolls; of these there are some ordinary, and others extraordinary; the masters in ordinary are twelve in number, some of whom sit in court every day during the term, and have referred to them interlocutory orders for stating accounts, and computing damages and the like; and they also administer oaths, take affidavits, and acknowledgments of deeds and recognizances. The masters-extraordinary are appointed to act in the country, in the several counties of England, beyond ten miles distant from London; by taking affidavits, recognizances, acknowledgments of deeds, &c. for the ease of the suitors of the court.

Master of the faculties, an officer under the archbishop of Canterbury, who grants licences and dispensations.

Master of the horse, an office of honour and trust, and seldom conferred upon any but some of the peerage in possession of his majesty's confidence. The department of the master of the horse is of very considerable magnitude, possessing a greater extent of patronage than almost any other appointment in the gift of the crown. The master of the horse is the supreme superintendant of every thing appertaining to the establishment of the king's stables and their contents. It is within his official department to take cognizance of every part of the royal retinue in which horses, carriages, and their requisite attendants, are concerned; as well as personally to attend upon his majesty whenever they are employed; but more particularly upon all public occasions, and in all processions of state. He also appears in personal attendance upon his majesty in the chase; unless that upon some occasions, by the king's permission, the official service is dispensed with. Subordinate to the master of the horse in the stable establishment, are the equerries, pages of honour, clerk of the stables, yeomen riders, mews-keepers, coachmen, footmen, grooms, postilions, and helpers, exclusive of saddlers, coach, harness, and bit-makers. The establishment of the royal hunt is also officially announced in the department of the master of the horse; although the patronage and appointment remain with the master of the stag hounds.

Master general of the ordnance, a great officer, who has the chief command of the king's ordnance and artillery. See Ordnance.

Master of the rolls, is an assistant to the lord chancellor of England in the high court of chancery: and in his absence hears causes there, and gives orders. His salary is 1200l. per annum.

Master of a ship, the same with captain in a merchantman; but in a king's ship he is an officer who inspects the provisions and stores, and acquaints the captain with what is not good, takes particular care of the rigging and of the ballast, and gives directions for stowing the hold; he navigates the ship under the directions of his superior officer; sees that the log and log-book are duly kept; observes the appearance of coasts; and notes down in his journal any new shoals or rocks under water, with their bearing and depth of water, &c.

Master at arms, in a king's ship, an officer who daily, by turns, as the captain appoints, is to exercise the petty officers and ship's company; to place and relieve sentinels; to see the candles and fire put out according to the captain's orders; to take care the small arms are kept in good order, and to observe the directions of the lieutenant at arms.

Master of the Temple. The founder of the order of the templars and all his successors were called *magni templi magistri*; and ever since the dissolution of the order the spiritual guide and director of the house is called by that name. (See Temple and Templar.) There were also several other officers under this denomination, as master of the wardrobe, with a salary of 2000l. a-year; master of the harriers, with 2000l. a-year; master of the stag-hounds, with 800l. a-year; master of the jewel office, &c. all now abolished.

MASTER-HAND. *s.* The hand of a man eminently skilful (*Pope*).

MASTER-JEST. *s.* Principal jest.

MASTER-KEY. *s.* The key which opens many locks, of which the subordinate keys open each only one (*Dryden*).

MASTER-SINEW. *s.* A large sinew that

surrounds the hough, and divides it from the bone by a hollow place, where the windgalls are usually seated (*Farrier's Dict.*).

MASTER-STRING. *s.* Principal string (*Rowe*).

MASTER-STROKE. *s.* Capital performance (*Blackmore*).

MASTER-TEETH. *s.* The principal teeth (*Bacon*).

MASTER WORT, in botany. See IMPERATORIA.

MA'STERDOM. *s.* (from *master.*) Dominion; rule: not in use (*Shakspeare*).

MA'STERLESS. *a.* (from *master.*) 1. Wanting a master or owner (*Spenser*). 2. Ungoverned; unsubdued.

MA'STERLINESS. *s.* (from *masterly.*) Eminent skill.

MA'STERLY. *a.* (from *master.*) 1. Suitable to a master; artful; skilful (*Addison*). 2. Imperious; with the sway of a master.

MA'STERLY. *ad.* With the skill of a master (*Shakspeare*).

MA'STERPIECE. *s.* (*master* and *piece.*) 1. Capital performance; any thing done or made with extraordinary skill (*Davies*). 2. Chief excellence (*Clarendon*).

MA'STERSHIP. *s.* (from *master.*) 1. Dominion; rule; power. 2. Superiority; pre-eminence (*Dryden*). 3. Chief work (*Dryd.*). 4. Skill; knowledge (*Shakspeare*). 5. A title of ironical respect (*Shakspeare*).

MA'STERY. *s.* (from *master.*) 1. Dominion; rule (*Raleigh*). 2. Superiority; pre-eminence (*L'Estrange*). 3. Skill; dexterity (*Tillotson*). 4. Attainment of skill or power (*Locke*).

MA'STFUL. *a.* (from *mast.*) Abounding in mast, or fruit of oak, beech, or chestnut (*Dryden*).

MASTIC TREE. See LENTISCUS, PISTACHIA, and MASTICHE.

MASTIC (Tree Indian). See SCHINUS.

MASTIC THYME. See ORIGANUM and THYMUS.

MASTIC (Tree herb). See SATUREIA.

MASTICATION (*masticatio*, from *mastico*, to chew.) The act of chewing. A natural function. The mixing together and dividing of the particles of the food in the mouth, by the action of the jaws, tongue, lips, and cheeks. By means of this function the food is lacerated and mixed with the saliva and the mucus of the mouth and fauces, and thus made into a bole of such a consistence as to be formed into a convenient size to be swallowed. See DEGLUTITION.

MASTICATORIES (*masticatoria*, from *mastico*, to chew.) Such medicines as are intended for chewing.

MASTICHE (*masticke*, μαςιχη: from μαςςω, to express.) Mastix. Mastich. The tree which affords this resin is the pistachia lentiscus; foliis abrupte pinnatis, foliis lanceolatis, of Linnéus; a native of the south of Europe. In the island of Chio the officinal mastich is obtained most abundantly, and, according to Tournefort, by making transverse incisions in the bark of the tree, from whence the mastich exudes in drops, which are suffered to run down to the ground, when, after sufficient time is allowed for their concretion, they are collected for use. Mastich is brought to us in small, yellowish, transparent, brittle tears or grains; it has a light agreeable smell, especially when rubbed or heated; on being chewed it first crumbles, soon after sticks together, and becomes soft and white, like wax, without impressing any considerable taste. It is considered to be a mild corroborant and adstringent; and as possessing a balsamic power it has been recommended in hæmoptysis, proceeding from ulceration, leucorrhœa, debility of the stomach, and in diarrhœas, and internal ulcerations. Chewing this drug has likewise been said to be of use in pains of the teeth and gums, and in some catarrhal complaints; it is, however, in the present day seldom used either externally or internally. The wood abounds with the resinous principle; and a tincture may be obtained from it, which is esteemed in some countries in the cure of hæmorrhages, dysenteries, and gout.

MASTICH HERB (Common). See MARUM VULGARE.

MASTIFF, in mastiology. See CANIS.

MASTIGADOUR, or SLAVERING-BIT. In the manage, a snaffle of iron, smooth, and of a piece, guarded with paternosters, and composed of three halfs of great rings made into demi-ovals of unequal bigness, the lesser being inclosed within the greatest, which ought to be about half a foot high. A mastigadour is mounted with a head-stall and two reins. The horse, in champing upon the mastigadour, keeps his mouth fresh and moist, by the froth and foam that he draws from the salivary glands. To put a horse to the mastigadour, is to set his croup to the manger, and his head between two pillars in the stable. Horses accustomed to hang out their tongues, cannot do it when the mastigadour is on, for that keeps the tongue so much in subjection that they cannot put it out. This instrument of torture is little, if at all, used at present.

MASTIOLOGY (frrom μαστος and λογος.) See MASTOLOGY.

MASTIX. See MASTICHE.

MA'STLESS. *a.* (from *mast.*) Bearing no mast (*Dryden*).

MA'STLIN. *s.* Mixed corn: as, wheat and rye (*Tusser*).

MASTODYNIA. (*massadynia*, μαςοδυνια; from μαςος, a breast, and οδυνη, pain.) Phlegmon of the breast of women. It is characterized by all the symptoms of acute inflammation, and mostly terminates in abscess.

MASTOID (*mastoideus*; μαςος, a breast, and ειδος, resemblance.) In anatomy, the processes of bones are so termed that are shaped like the nipple of the breast.

MASTOIDEUS, (μαςοειδαιος: from μαςοειδης, the mastoid process.) In anatomy, inserted into, or belonging to the mastoid process. See STERNO CLEIDO-MASTOIDEUS.

MASTOLOGY (from μαςος, *mamma*, a

breast, and λογος, a treatise or discourse.) The science of mammals or mammalian animals; of those that suckle their young; as ornithology is the science of birds, and ichthyology of fishes.

We trust we shall not be accused of pedantry in coining this term to supply what has appeared to us a palpable vacancy in natural history, and a vacancy which no other term is so well able to fill up. We have formed it in perfect analogy with the correlative terms that classify the animal kingdom, and we are confident it will be found useful. The Greek compounds of μαστος, would justify us in writing either mastology, or mastiology: but the former is perhaps best, as most consonant with various terms already in use in anatomy and medicine, derived from the same source, as mastoidæus and mastodynia.

Thus explained mastology comprises the first class in the Linnéan zoology, and consists of the following orders,

| | |
|---|---|
| Primates, | Pecora, |
| Bruta, | Belluæ, |
| Feræ, | Cete: |
| Glires, | |

and is thus characterized classifically. Lungs respiring alternately: jaws incumbent, covered; teeth usually within; teats lactiferous; organs of sense, tongue, nostrils, eyes, ears, and papillæ of the skin; covering, hair which is scanty in warm climates, and hardly any on aquatics; supporters four, feet, or feet and hands except in aquatics; tail mostly; walk mostly on the earth and speak. In much of the external and internal structure they resemble each other: the chief of them are quadrupeds, as this word was formerly used to express hands as well as feet, and inhabit the surface of the earth. The largest, though fewest in number, inhabit the ocean.

The ordinal characters are taken from the number, situation and structure of the teeth; which is all that is necessary to observe in this article; these characters being given at length under the different terms describing the orders as above.

It must appear to the most superficial observer, from this brief and general statement, that nothing can be more loose and distant than the chain by which many of the genera and even of the orders of this class are connected together: a class that includes tribes varying as widely as possible in their degree of intelligence, in their general shape and appearance, in their habits and manners, and in the element in which they live: a class that extends from the man to the mouse, and unites the horse with the whale. Not however that we are much disposed to find fault with the arrangement on this account, for the different species, genera and orders run so much into each other, that although we are startled at the extreme points, we do not know where to terminate the individual gradations, shade is so continually softening into shade, and link so connected even by nature with link: but we mention the fact to shew the difficulty of acquiring any thing like perfection in any classification whatever. The general and the particular rules of nature being so intervolved as to prevent all hope upon this subject; and to urge this important reflexion upon our readers, that artificial systems of all kinds are not laws of God but mere helps to man: they are of high use in enabling him to acquire knowledge, but they perpetually show him his weakness by compelling him to have recourse to such auxiliary means.

The Linnéan classification, however, chiefly on account of its combining such discrepant materials, has been objected to by many physiologists, who have endeavoured, but perhaps only endeavoured, to improve upon it; and even this rather by a re-modelling of the orders than by any infringement upon the genera. We can notice but two of these arrangements, that of M. Cuvier, and that of M. Blumenbach.

The former divides the genera constituting the same class and under the same name into three orders from the form of the feet; a clawed or nailed; a hoofed; and a finned.

The claw or nail-footed consists of six families as follows:

I. Bimanum (Man alone).
II. Quadrumana.
III Sarcophaga.
IV. Rodentia.
V. Edentata.
VI. Tardigrada.

Of these the first three families are described as having three sorts of teeth; and the last three as wanting one, at least, of these three sorts of teeth.

The hoof-footed class consists of the following three families:

VII. Pachidermata.
VIII. Ruminantia.
IX. Solipeda.

The fin-footed class consists of two families only; which are as follow:

X. Amphibia.
XI. Cetacea.

In Blumenbach we find little more than the families of Cuvier converted directly into orders, which are ten in number, and are arrang- as follows:

I. Bimanum.
II. Quadrumana.
III. Bradypoda.
IV. Cheiroptera (Bat only).
V. Glires.
VI. Feræ.
VII. Solidungula (Horse and ass only).
VIII. Pecora or Bisulca.
IX. Belluæ.
X. Cetacea.

As we shall have occasion to return to these systems in the article ZOOLOGY, we think it unnecessary to give more than this brief outline of them at present.

In the class before us man perceives his best friends, and his most formidable enemies. The dog, the horse, the cow, the cat, the sheep, the ass, the mule, and the elephant, are the principal favourites and most useful assistants that mankind find among the inferior tribes. The wolf,

the lion, the tyger, the river-horse, make the most obstinate resistance to his authority as the lord of the lower creation; and notwithstanding his superior cunning and address, and his opposing the strength and activity of numbers to their single and irregular exertions, frequently give him the most mortifying proofs of the precarious nature of his dominion.

Besides their abilities to assist or annoy us, there are other circumstances which recommend this class of animals in a particular manner to our notice. Their situation and character are such as to afford us opportunities of more frequent intercourse with them than with other animals Fishes inhabit a different element: birds mount aloft in the air, and when they rest upon the earth generally prefer places inaccessible to man; insects are so minute as almost to elude our observation; reptiles shun our society, and their manners are far from inviting:—But quadrupeds cannot so easily avoid us; many of them eagerly associate with us, unless repelled by injuries; their manners and circumstances bear a considerable resemblance to our own; and the characters of many of them naturally attract our notice, and engage our affections.

The class of mammals, so particularly related to man, are remarkably superior in size and strength to those belonging to the other classes. The horse, the ox, the camel, the elephant, are among the strongest of the land animals. Few of the inhabitants of the ocean, or of rivers, are equal to the hippopotamus; and the cetaceous animals, which, from similarity of internal structure, from their being viviparous, and from their being furnished with a lactiferous organ are considered in the same class, are by far the largest animals of the waters.

In ingenuity, perhaps not less than in strength, quadrupeds enjoy also a superiority over most other animals. The familiar docility of the dog is well known. The address with which horses are trained to perform the evolutions of military discipline, affords the best proof of the extraordinary docility and sagacity of these animals. The cunning, and indeed the whole economy of the monkey tribe, seem to exceed even the ordinary instances of human ingenuity. The sagacity and the social dispositions of the beaver are not less admirable. In short, ingenuity, or a most wonderful instinct, little inferior in many instances to the boasted wisdom of man, distinguishes this class of animals, as eminently as form, strength, size, and other relations to the human species, above the other lower ranks of the animal creation.

In beauty and elegance of form, too, quadrupeds greatly excel most other animals. We admire the downy plumage, the brilliant colours, and the melodious voices of birds: the gaudy painting of the butterfly, and of various other insects, charm the virtuoso: golden fishes and spotted lizards find likewise their admirers: but the fine proportions of the dog and the horse are unequalled among the other tribes of animated nature; and, compared with the beauties of shape, those of colour are of a very inferior kind. We are, perhaps, better judges of the beauty of tame quadrupeds than of that of other animals. Habit has amazing power to reconcile us to things odious, and to render us fond of things which we should otherwise regard with indifference: the forms of these animals are familiar to us; and it may be for that reason that they please. Besides, utility has certainly some influence on our ideas of beauty. However these things be, it is undeniable that among the class of quadrupeds are to be found the animals the most remarkable for elegance and harmony of shape.

Man may proudly boast that the earth was made for him; but a little reflection may lead him to acknowledge, that, at least in a secondary view, it has been likewise designed for the accommodation and maintenance of these animals. Of the herbage and fruits which it produces quadrupeds enjoy a greater share than any other tribes of the inferior animals; and a greater, perhaps, than even man himself. See PHYSIOLOGY and ZOOLOGY.

MASULIPATAN, a town on the Coromandel coast in the East Indies. The inhabitants are Gentoos. Its trade has greatly decreased since the English have left off trading in chintz. It is about 200 miles N. of Fort St. George. Lat. 16. 15 N. Lon. 81. 15 E.

MAT. *s.* (meatte, Saxon.) A texture of sedge, flags, or rushes (*Carew*).

*To* MAT. *v. a.* (from the noun.) 1. To cover with mats. 2. To twist together: to join like a mat (*Dryden*).

MAT-GRASS, in botany. See NARDUS.

MAT-WEED. See LYGEUM.

MATACA, or MANTACA, a commodious bay on the north side of the island of Cuba, in America. The galleons usually take in fresh water here on their return to Old Spain.

MATADORE. *s.* (*matador*, Spanish.) One of the three principal cards in the games of ombre and quadrille (*Pope*).

MATACHIN. *s.* (Fr.) An old dance (*Sid.*).

MATALONA, a town of Terra di Lavora, in Naples, Italy. It is 8 miles N.W. of Capua. Lat. 41. 12 N. Lon. 14. 14 E.

MATALISTA RADIX. A root said to be imported from America, where it is given as a purgative, its action being rather milder than that of jalap. Its arrangement in the sexual system not known.

MATAMAN, a country of Africa, bounded on the N. by Benguela, on the E. by parts unknown, on the S. by the country of the Hottentots, and on the W. by the Atlantic Ocean. There is no town in it, and the inhabitants live in miserable huts, it being a desert country, little visited by the Europeans.

MATAN, or MACTAN, one of the Philippine Islands. Here Magellan was killed in 1521; and the inhabitants have since thrown off the yoke of Spain.

MATAPAN (Cape), the most southern promontory of the Morea, between the gulf of Coron and that of Colochina. Lon. 22. 40 E. Lat. 36. 25 N.

MATARAM, a large town, formerly the capital of an empire of that name, in the island of Java. It is strong by situation, and seated in a fertile and populous country, surrounded by mountains. Lon. 111. 55 E. Lat. 7. 1? S.

MATARO, a town of Spain, in Catalonia, remarkable for its glass works, and the best red wine made in the province. It is seated on the Mediterranean, 15 miles N. E. of Barcelona. Lon. 2. 29 E. Lat. 41. 36 N.

MATCH. *s.* (*meche*, French) 1. Any thing that catches fire (*Bacon*). 2. (from maca, Sax.) A contest; a game (*Shak.*). 3. One equal to another; one able to contest with another (*Rogers*). 4. One that suits or tallies with another. 5. A marriage (*Shakspeare*). 6. One to be marred (*Clarendon*).

*To* MATCH. *v. a.* (from the noun.) 1. To be equal to (*Shak.*). 2. To show an equal (*South*). 3. To oppose as equal (*Milton*). 4. To suit; to proportion (*Roscommon*). 5. To marry; to give in marriage (*Donne*).

*To* MATCH. *v. n.* 1. To be married (*Sid.*). 2. To suit; to be proportionate; to tally.

MATCH OF HUNTING, or *Heats for a plate*; an object not strictly within the views of veterinary medicine, yet important in equestrian economy, and abundantly interesting to the sportsman. In order to ride to the best advantage, either a hunting-match, or three heats and a course for a plate, we are told by writers on this subject (whom we implicitly follow), that the first thing requisite is a rider, who ought to be a faithful one, in whom you can confide. "He should have a good close seat, his knees being held firm to his saddle-skirts, his toes being turned inwards, and his spurs outwards from the horse's sides, his left hand governing the horse's mouth, and his right commanding the whip; taking care, during the whole time of the trial, to sit firm in the saddle, without waving, or standing up in the stirrups, which actions do very much incommode a horse, notwithstanding the conceited opinion of some jockies, that it is a becoming seat,

"In spurring his horse, he should not strike him hard with the calves of his legs, as if he would beat the wind out of his body, but just turn his toes outwards, and bring his spurs quick to his sides, and such a sharp stroke will be of more service towards the quickening of the horse, and sooner draw blood. Let him be sure never so spur him but when there is occasion, and avoid spurring him between his shoulders and girths (which is the tenderest part of a horse) till the last extremity. As to the whipping the horse, it ought to be over the shoulder on the near side, except in hard running, and when at all, strike the horse in the flank with a strong jerk, the skin being tender there, and most sensible of the lash.

"He must observe, when he whips and spurs his horse, and is certain that he is at his utmost speed, if then he clap his ears to his pole, or whisk his tail, he may be sure that he bears him hard; and then he ought to help him as much as he can, by sawing his snaffle to and fro in his mouth, and by that means forcing him to open his mouth, which will give him wind.

"If in the time of riding there is any high wind stirring, if it be in his face, he should let the adversary lead, he holding hard behind him till he sees an opportunity of giving a loose; yet he must take care to keep so close to him that his adversary's horse may break the wind from his, and that he, by stooping low in his seat, may shelter himself under him, which will assist the strength of his horse. But on the contrary if the wind be at his back, he must ride exactly behind him, that his own horse may alone enjoy the benefit of the wind, by being as it were blown forward, and by breaking it from his adversary as much as possible.

"In the next place, observe what ground your horse prefers most to run on, and bear the horse (as much as your adversary will give you leave) on level carpet ground, because the horse will naturally be desirous to spend himself more freely thereon; but on deep earths give him more liberty, because he will naturally favour himself upon it.

"If you are to run up hill, do not forget by any means to favour your horse, and bear him, for fear of running him out of wind; but if it be down hill (if your horse's feet and shoulders will endure it, and you dare venture your neck) always give him a loose.

"This may be observed as a general rule, that if you find your horse to have the heels of the other, that then you be careful to preserve his speed till the last train-scent, if you are not to run a strait course; but if so, then till the end of the course, and so to husband it then also, that you may be able to make a push for it at the last post.

"In the next place you are to acquaint yourself, as well as you can, with the nature and temper of your adversary's horse; and if he be fiery, then to run just behind, or just cheek by joul, and with your whip make as much noise as you can, that you may force him on faster than his rider would have him, and by that means spend him the sooner; or else keep just before him, on such a slow gallop, that he may either overreach, or by treading on your horse's heels (if he will not take the lead) endanger falling over.

"Take notice also on what ground your opponent's horse runs the worst, and be sure to give a loose on that earth, that he may be forced to follow. In like manner, in your riding observe the several helps and corrections of the hand, the whip, and the spur, and when and how often he makes use of them; and when you perceive that his horse begins to be blown by any of the former symptoms, as clapping down his ears, whisking his tail, holding out his nose like a pig, &c. you may then take it for granted that he is at the height of what he can do; and therefore in this case take notice how your own rides, and if he run cheerfully and strongly, without spurring, then be sure to keep your adversary to the same speed, without giving him ease, and by so doing you will quickly bring him to give in, or else distance him. Observe at the end of every train-scent what condition the other horse is in, and how he holds out in his labour, of which you may be able to make a judgment by his looks, the working of his flanks, and the slackness of his girths. For if he look dull, it is a sign that his spirits fail him; if his flanks beat much, it is a token that his wind begins to fail him; and consequently his strength will do so too.

"If his wind fail him, then his body will grow thin, and appear tucked up, which will make his girths, to the eye, seem to be slack; and therefore you may take this for a rule, that a horse's want-

ing girting after the first scent, provided he were girt close at his first starting, is a good sign, and if you find it so you need not much despair of winning.

"After the end of every train-scent, and also after every heat for a plate, you must have dry straw and dry cloths, both linen and woollen, which have been steeped in urine and salt-petre a day or two, and then dried in the sun, and also one or two of each must be brought into the field wet; and after the train has been ended, two or three persons must help you, and after the groom has with a knife of heat (as it is called by the duke of Newcastle), which is a piece of an old sword blade, scraped off all the sweat from the horse's neck, body, &c. then they must rub him well down dry, all over, first with the dry straw, and then with dry cloths, whilst others are busy about his legs; and as soon as they have rubbed them dry, then let them chafe him with the wet cloths, and never give over till you are called by the judges to start again. This will render his joints pliant and nimble, and prevent any inflammation which might arise from any old strain."

The next thing regarded by the writer of these profound instructions is the judges' or triers' office. These are persons appointed to see that all things are ordered according to the articles agreed on. These, which are read before the horses start, are as follow:

1. That each trier, on whose side the train is to be led, according to the articles, give directions for its leading, according to the advice of the rider, or his knowledge of the nature and disposition of that horse on whose side he is chosen.

2. That each trier be so advantageously mounted, as to ride up behind the horses (but not upon them) all day, and to observe that the contrary horse ride his true ground, and observe the articles in every particular, or else not to permit him to proceed.

3. That after each train-scent be ended, each trier look to that horse against which he is chosen, and observe that he be no ways relieved but with rubbing, except liberty on both sides be given to the contrary.

4. As soon as the time allowed for rubbing be expired, which is generally half an hour, they shall command them to mount, and if either rider refuse, it may be lawful for the other to start without him; and having beat him the distance agreed on, the wager is to be adjudged on his side.

5. The triers shall keep off all other horses from crossing the riders; only they themselves may be allowed to instruct the riders by word of mouth how to ride, whether slow or fast, according to the advantages he perceives may be gained by his directions.

6. If there be any weight agreed on, they shall see that both horses bring their true weight to the starting-place, and carry it to the end of the train, upon the penalty of losing the wager.

The same rules are to be observed, especially this last, by those gentlemen who are chosen to be judges at a race for a plate, only they usually stay in a stand, that they may the better see which horse wins the heat.

"Now," continues the writer, "in running for a plate, there are not so many observations to be made, nor more directions required, than what have been already given, only this, if you know your horse to be rough at bottom, and that he will stick at mark, to ride him each heat according to the best of his performance, and avoid as much as possible either riding at any particular horse, or staying for any, but to ride each heat throughout with the best speed you can.

"But if you have a very fiery horse to manage, or one that is hard-mouthed and difficult to be held, then start him behind the rest of the horses, with all the coolness and gentleness imaginable; and when you find he begins to ride at some command, then put up to the other horses, and if you find they ride at their ease, and are hard held, then endeavour to draw them on faster; but if you find their wind begin to rake hot, and that they want a sob, if your horse be in wind, and you have a loose in your hand, keep them up to their speed, till you come within three quarters of a mile of the end of the heat, and then give a loose and push for it, and leave to fortune and the goodness of your horse the event of your success.

"Lastly, when either your hunting-match or the trial for the plate is ended, as soon as you have rubbed your horse dry, clothe him up and ride him home, and the first thing, give him the following drink to comfort him:

"Beat the yolks of three eggs, and put them into a pint and a half of milk, then warm it and put to it a little saffron, and three spoonfuls of salad-oil, and give it him in a horn.

"Having done this, dress him slightly over with the curry-comb, brush, and woollen-cloth, and then bathe the place where the saddle stood with warm sack, to prevent warbles; and wash the spurring-places with urine and salt: then litter the stable very well, clothing him up as quickly as possible, and let him stand for two hours. Then feed him with rye bread, after that with a good mash, and give him his belly-full of hay, and what corn and bread he will eat. Then having bathed his legs well, leave him corn in his locker, and so let him rest till the next morning, at which time order him as in his days of rest."

*The ordering a horse for a Match, or Plate*, is a most important part of equestrian discipline. The reasoning on this subject would disgust an enlightened veterinarian, no less than the system of jockeyship we have just unfolded, though for a different reason. We shall therefore confine ourselves to a few particulars, which will shew the customary method of training horses designed for the turf. "When you have either matched your horse, or design to put him in for a plate," says the writer, "you should consider that you ought to reserve a month, at least, to draw his body perfectly clean, and to refine his wind to that degree of perfection that is capable of being attained by art.

"In the first place, take an exact view of the state of his body, both outwardly and inwardly, as whether he be low or high in flesh, or whether he be dull and heavy when abroad; and if this has been caused by too hard riding, give him half an ounce of diapente in a pint of good old Malaga sack, which will both cleanse his body and revive his spirits. Then for the first week feed him continually with bread, oats, and split beans, giving him sometimes the one and sometimes the other, according to what he likes best, always leaving him some in his locker for him to eat at leisure when you are absent; and when you return at your hours of feeding, take away what is left, and give him fresh, till you have made him wanton and playful. To this purpose, take no-

tice that though you ride him every day, morning and evening, on airing, and every other day on hunting, yet you are not to sweat him, or put him to any violent labour, the design of his week's ordering beingto keep him in wind and breath, and to prevent pursiveness.

"You must now make a finer bread than before, as follows: Take two pecks of beans, and a peck of wheat, and let them be ground together, but not too fine, to prevent too much bran being in the bread; and dress one peck of the meal through a fine range, and knead it up with new ale-yeast, and the whites of a dozen new-laid eggs, and bake this in a loaf by itself; but dress the rest of the meal through a boulter, and knead it only with ale and yeast, and use it in all other points as the former: the peck loaf is to be given the horse when you set him, and the other at ordinary times. This bread very much increases the strength, courage, and wind of the horse.

"If your horse be brisk and lively, when you lead him out of the stable he will leap and play about you, then you must not only omit giving him the sack and diapente, but any other dose whatsoever; for it will rather prey upon the strength of his body, and by that means weaken him.

"If your horse be engaged in a hunting-match, you must sweat him twice this week, not by hunting him after the hare, but by train-scents, since the former, on this occasion, may prove deceitful; for though the hounds should be very swift, yet the scent being cold, the dogs will very often be at fault, and by that means the horse will have many sobs: so that when he comes to run train-scents in earnest, he will expect ease for his wind. Therefore lead your train-scents with a dead cat, over such grounds as you are likely to run on, and best agrees with the humour of your horse, and also choose the fleetest hounds you can get, and they will keep your horse up to the height of his speed. As to the number of train-scents which you should ride at a time, that is to be ordered according to the match you are to run, or rather according to the strength of your horse, and ability for performing his heats; for if you labour him beyond his strength, it will take him off his speed, weaken his limbs, and daunt his spirit. If you give him too little exercise it will render him liable to be pursive, and full of humours, and incline him to a habit of laziness, so that when he comes to be put to labour beyond his usual rate, he will grow restive and settle, like a jade. But so far may be said by way of direction, that if you are to run eight train-scents, and the strait course, more or less, you are not to put him to such severe labour above twice in the whole month's keeping. And if it be in the first fortnight it will be the better, for then he will have a whole fortnight to recover his strength in again: and as for his labour in his last fortnight, let it be proportionate to his strength and wind, as sometimes half his task, and then three quarters of it.

"Only observe, that the last trial you make in the first fortnight be a train-scent more than your match, for by that means you will find what he is able to do. And as to the proportion of his exercise twice a week, that is sufficient to keep him in breath, and yet will not diminish or injure his vigour. But if your hunting-match be to run fewer trains, then you may put him to his whole task the oftener, according as you find him in condition; only observe that you are not to strain him for ten days at least before he ride his match, that he may be led into the field in perfect strength and vigour.

"If you design your horse for a plate, let him take his heats according to this direction, only let him be on the place, that he may be acquainted with the ground; and as for the hounds, you may omit them, as not being tied to their speed, but that of your adversary's horse. But as to the number of heats, let them be according to what the articles exact; only observe, that, as to the sharpness of them, they must be regulated according to the strength, and the goodness of his wind. And when you heat him, provide some horses upon the course to run against him; this will quicken his spirits and encourage him, when he finds that he can command them at his pleasure. And here too you must observe the same rule, not to give the horse a bloody heat for ten days, or a fortnight, before the plate is to be run for; and let the last heat you give him before the day of trial be in all his clothes, and just skelp it over, which will make him run the next time the more vigorously, when he shall be stript naked, and feel the cold air pierce him.

"During this month, and on his resting days, and after his sweats on heating-days (if there be any occasion for sweating him), you must observe the same rules which have been given for the first week of the third fortnight's keeping, only you must omit all scourings but rye-bread and mashes, since your horse being in so perfect a state of body has no need of any.

"During the last fortnight you must give him dried oats that have been hulled by beating, and having washed half a strike of oats in the whites of a dozen or twenty eggs, stir them together, and let them lie all night to soak, and spread them abroad in the sun the next morning, till they are as dry as they were at first, and so give them to your horse, and when they are spent, prepare another quantity after the same manner. This food is light of digestion, and very good for his wind.

"You must hull his beans also, but not give him them so often, if he will eat his oats without them; and as for his bread at this time, make that of three parts wheat, to one of beans, and order it as before directed. But if you find your horse inclinable to be costive, then give him oats washed in two or three whites of eggs, and ale beaten together, to cool his body, and keep it moist. Give him not any mash for the last week, only the barley-water before directed, but let him have his fill of hay, till a day before he is to ride the match, when you must give it him more sparingly, that he may have time to digest what he has eaten, and then, and not before, you may muzzle him with a cavesson; and be sure that day, and not till the morning he is let out, to feed him as much as possible, for such a day's labour will require something to maintain his strength. Therefore in the morning before you are to lead out, give him a toast or two of white bread steeped in sack, which will invigorate him; and when you have done, lead him out into the field.

"But if you are to run for a plate, which commonly is not till three o'clock in the afternoon, then by all means have him out early in the morning to air, that he may empty his body, and when he is come in from airing, feed him with toasts in sack; considering, that as too much ful-

ness will endanger his wind, so too long fasting will cause faintness.

"When he has eaten what you have thought fit to give him, put on his cavesson, and having afterwards well chafed his legs with piece-grease and brandy warmed together, or train oil (which likewise ought to be used daily at noon, for a week before the match, or longer if you see cause), shake up his litter, and shut the stable up close, and take care that there is no noise made near him, and let him rest till the hour come that he is to go out into the field." For the rest, see Horse-racing.

Match, a kind of rope slightly twisted, and prepared to retain fire for the uses of artillery, mines, fireworks, &c. It is made of hempen tow, spun on the wheel like cord, but very slack; and is composed of three twists, which are afterwards again covered with tow, so that the twists do not appear: lastly, it is boiled in the lees of old wines. This, when once lighted at the end, burns on gradually and regularly, without ever going out, till the whole is consumed: the hardest and driest match is generally the best.

Match (Quick), used in artillery, is made of three cotton strands drawn into lengths, and put into a kettle just covered with white wine vinegar, and then a quantity of saltpetre and mealed powder is put into it, and boiled till well mixed. Others put only saltpetre into water, and after that take it out hot, and lay it into a trough with some mealed powder, moistened with some spirits of wine, thoroughly wrought into the cotton by rolling it backwards and forwards with the hands; and when this is done they are taken out separately, drawn through mealed powder, and dried upon a line.

M. Proust, and M. Cadet, in Journal de Physique, describe an economical substitute for quick match in the artillery service.

The Spanish ambassador at Vienna, in 1789, gave notice to his court, that the use of thin rods of lime tree soaked in a solution of nitrate of lead, was adopted in the Imperial service in lieu of quick-match. Mr. P. has forgot whether the author of this discovery was named, but it was probably baron Born.

As the lime or linden tree is scarce in Spain, other woods were tried. The principal fault of these wooden rods is the brittleness of their point, but this does not entirely extinguish them, for it is sufficient to twirl them about a little to relight them.

A pound of nitric acid at 36° yields, with lead, upwards of 15 oz. of dry nitrate; but as a great part of the acid is wasted in oxydizing the metal, if this was employed in the state of oxide, more might be obtained; thus, a pound of the same acid treated with litharge yielded nearly 23 oz. of nitrate. The loss of acid in the former process was very great, for a pound of nitric acid at 25° yields, with potash, 8 oz. of saltpetre; but if another pound be treated with metallic lead, and the nitrate decomposed by potash, only 3 oz. of saltpetre is obtainable.

The rods must not be too thick, or otherwise the nitrate does not penetrate to the centre; the best thickness is about 2 or $2\frac{1}{2}$ lines ($\frac{1}{6}$ or $\frac{1}{5}$ inch) but in order to increase their strength they may be made broader one way than the other. Yet thick rods have some advantages, for the unimpregnated centre burning slower than the superficial parts, gives a solidity to the lighted point, and renders it less liable to break off.

Rods of willow or elm will not burn unless they are impregnated throughout, and those of ash and beech which are more than a line ($\frac{1}{12}$ inch) thick, do not absorb sufficient nitrate to burn without being liable to go out.

The solution may be made of two different strengths; that of one pound of nitrate in 4 of water is best for green oak, elm, and willow; and that of one pound of nitrate in 5 of water for lime-wood, oak, fir, walnut, white poplar and cedar. The impregnation may be performed in 3 days in the cold, or in one hour and a half, if the solution is boiled.

Rope made of broom-stalks, about $\frac{3}{4}$ in. thick, may be advantageously impregnated with a solution of one pound of nitrate in 15 of water. This is superior to the others, because it will burst into a flame if it be twirled round, and so perform the office of a port-fire. It might probably be still more useful if it was spun with a better prepared strand in the centre, or with the *pittle* (rush?) so common in the interior of Spain.

The following are the results of the experiments made with nitrate of lead.

| Woods, &c. | Duration of the combustion of 25lb. Hours. | Nitrate absorbed by an cwt. lb. |
|---|---|---|
| Quickmatch | 850 | |
| Broom rope prepared | 850 | 4 |
| Lime | 2400 | 10 |
| Fir | 2400 | 42 |
| Cedar | 2400 | 42 |
| Elm | 2430 | 19 |
| Oak | 2200 | 18 |
| Green oak | 1400 | 18 |
| Walnut | 1400 | 7 |
| White poplar | 1400 | 37 |
| Willow | 2400 | 30 |

Hence it is evident that the lime is the best, that the oaks, elm, and walnut are next best, and that poplar, fir, cedar and willow absorb a great quantity of nitrate without any advantage.

The nitrate of copper may be used instead of the nitrate of lead, and its power of increasing the combustion is such, that the rods taken fresh out of the solution burn equally well as those impregnated with nitrate of lead do when dried. It is not so much the acid of these salts that produce the effects as might be supposed, for if they are soaked for some time in water, they still preserve much of their peculiar qualities. It rather appears that the oxides of these nitrates separate from the acid and attach themselves to the substance of wood, and then furnish the oxygen necessary to the combustion of the rods; agreeable to this opinion, the lead is reduced in grains, and and the copper coats the point with a thin sheath of metal which it is sometimes necessary to get rid of, by striking the point against the cannon.

One pound of nitric acid at 36° is saturated by $2\frac{1}{2}$ oz. of copper. The solution used to impregnate the rods exhibited 17° of Beaume's hydrometer. The solution of copper procured in the process of parting by the refiners may be employed; and if a proper proportion of lead is boiled in it, this solution may be changed into nitrate of lead; but if too much lead is added, a yellow lamellar nitrate is formed, whose effect on wood is unknown.

Walnut wood does not absorb sufficient nitrate of copper to form fire-sticks.

Nitrate of iron is unfit for this purpose, as it does not yield its oxygen, so easily as that of lead or copper.

The following are the results of the experiments with nitrate of copper

| Woods, &c. | Duration of the combustion of 25lb. Hours. | Nitrate absorbed by an cwt. lb. |
|---|---|---|
| Quickmatch | 850 | |
| Lime | 2500 | 6 |
| Fir | 2300 | 8 |
| Elm | 2100 | 7 |
| Oak | 2400 | 4 |
| Green oak | 2050 | 9 |
| White poplar | 2010 | 6 |
| Willow | 2130 | 9 |
| Ash | 1300 | 2 |

The superiority of the new firesticks is evident; a portfire lasts only three or four minutes, and is subject to break in carriage, and to throw out dangerous sparks; the firestick, a yard long, burns for three hours, is solid and not liable to be broke, or to throw out any sparks. As to the price, the saving is very considerable; a portfire costs from 6 to 9 sous, i. e. about 4½d, and the firestick from only 3 to 4 sous, i. e. about 1½ or 2d.

The firesticks have been used in the most rainy weather without being extinguished; their combustion was only somewhat slackened.

Mr. C. gives the following directions for preparing these fire-sticks. The wood is to be sawn into square laths ½ metre (yard) long, and 6 lines (½ in.) thick. Round rods do not afford so good a point as the square laths, which are terminated when in use by a quick cone, about two inches long. These laths ought to be made of wood that has been at least a year in store, and moreover exposed for half a day to the heat of a stove, heated to 30°. Cels. For want of a stove, they may be put into a baker's oven after the bread is drawn.

The nitrate of lead is best prepared by putting 16 ounces of litharge or red lead into a glass vessel, and pouring it on 13 ounces of nitric acid, (i. e. aquafortis) at 40° Beaume, mixed with 4 oz. of distilled water; the mixture is then to be heated until the solution is finished, when it is to be filtered and evaporated to dryness. It ought to yield about 20 oz. of nitrate of lead. Care must be taken that a sufficient quantity of the oxide of lead is used, otherwise the acid not being saturated will corrode the boiler.

The rods being laid in a well-tinned copper boiler, the necessary quantity of nitrate is to be added, and some water in the proportion of about a quart of water to each pound of the nitrate. The rods are to be kept down under the liquor by a piece of tinned copper laid upon them; the boiling is to be continued for six hours, adding fresh water as the other boils away. When the boiling is finished, they are to be taken out, drained, and then dried in a stove.

They are then to be put into a copper, or cast iron vessel, placed upon a sand bath. Oil of turpentine is to be added until it rises about an inch above them, and the whole slowly heated until the oil boils. As soon as it becomes white, and begins to rise, the vessel must be covered, and taken from the fire until it subsides, when it is again to be replaced upon the bath. This heating to ebullition ought to be repeated two or three times. When the oil is cold, the rods are to be wiped, and finally dried again in the stove for use. See farther on this interesting subject, Nos. 9 and 11 of the Retrospect of Philosophical Discoveries.

MATCH (Cock). See MAIN OF COCKS. A cock intended to fight in a match must not be less in weight than three pounds six ounces, nor more than four pounds eight ounces.

MA'TCHABLE. *a.* (from *match.*) 1. Suitable; equal; fit to be joined (*Spenser*). 2. Correspondent (*Woodward*).

MA'TCHLESS. *a.* (from *match.*) Having no equal (*Waller*).

MA'TCHLESSLY. *ad.* In a manner not to be equalled.

MA'TCHLESSNESS. *s.* (from *matchless*). State of being without an equal.

MA'TCHMAKER. *s.* (*match* and *maker*). 1. One who contrives marriages (*Hudibras*). 2. One who makes matches to burn.

MATCOWITZ, a strong town of Upper Hungary, in the county of Scepus, seated on a mountain, 185 miles N.E. of Presburgh.

MATE. *s.* (maca, Saxon.) 1. A husband or wife (*Spenser*). 2. A companion, male or female (*Dryden*). 3. The male or female of animals (*Milton*). 4. One that sails in the same ship (*Roscommon*). 5. One that eats at the same table. 6. The second in subordination in a ship: as, the master's *mate*; the chirurgeon's *mate*.

*To* MATE. *v. a.* (from the noun.) 1. To match; to marry (*Spenser*). 2. To be equal to (*Dryden*). 3. To oppose; to equal (*Shak*). 4. (*matter*, French.) To subdue; to confound; to crush: not in use (*Shakspeare*).

MATELICA, an ancient town of Italy, in the marquisate of Ancona, 15 miles S. of Jesi.

MATER (DURA and PIA) the names given by anatomists to the two membranes which surround the brain. See ANATOMY, and BRAIN.

MATERA, a town of Naples, in Terra d'Otranto, with a bishop's see; seated on the Canapro, 33 miles N.W. of Tarento. Lon. 16. 54 E. Lat. 40. 59 N.

MATERIA MEDICA. (*materia medica*, Lat. Literally *the matter* of remedy; though uniformly, by a misnomer, employed to signify the *means* of remedy.) The substances employed in the medical art in their most simple state; for in any state of combination or composition they constitute a part of what is called pharmacy, or the science of medical preparations.

A very short time since, the writer of this department in the Pantologia was requested to furnish an article upon the same subject in another and a highly respectable dictionary of sciences. He complied; and as he cannot add much to what he then contributed, he will again copy from the manuscript; with the important alteration, however, of adjusting the general table of the materia medica of Edinburgh, Dublin, and London, to the substances and names of the new edition of the London College, which was then only in a state of preparation.

It is a subject of curiosity, rather than of use, to enquire by what means mankind were induced in the first instance to have recourse to substances, when in a state of disease, which, for the most part, they abhor and fly from when in a state of health; and how they came to discern that in these substances chiefly nature has treasured up the remedies of sickness, the restoratives of a vitiated or debilitated constitution. From whatever

source this knowledge has been derived, we feel it daily to be a knowledge of a very important character, and we are sensible of its having been very generally diffused at a very early period of ancient history. Accident in the first instance, and experience confirming the result of some fortunate discovery, were perhaps the chief foundation of therapeutic science in the simplest and rudest ages of the world. Yet the whole can by no means be traced to this source, for the general fallacy of experience is sufficient to prove that it has had but a very small share in establishing the virtues which have been ascribed to most medicines: and it was probably from a too frequent disappointment in practice, from palpable proof of the uncertainty of those remedies which are recommended by the ancients, that physicians, in times comparatively modern, have been induced to seek for means not only of ascertaining more exactly the qualities of established medicines, but of investigating the virtues of substances altogether new and untried.

Hence unquestionably the union of chemistry with the art of healing; for among the earliest chemists we meet with the first attempts at departing from the usual catalogue of medicines in pursuit of a new list. Paracelsus led the way by introducing the absurd notion of astral influences and of signatures; to which succeeding and more rational chemists suggested the utility of a chemical analysis. The doctrine of astral influences and of signatures has been altogether exploded for a long time, though we still trace certain vestiges of its former existence in many of our latest publications on the materia medica. Chemical analysis, as it ought to do, has completely triumphed over the two former systems, and is daily extending its enquiries. To arts, manufactures, and commerce, these enquiries have been pre-eminently useful; nor have they been without their benefit to medicine; yet the benefit resulting from this last application has by no means been equal to that which has resulted to the two former.

The means then resorted to in the present day for determining substances to be remedial or medicinal, or in other words the previous steps to their introduction into the materia medica, are their own sensible qualities, their botanical affinity, their chemical examination, and general experience.

Having introduced them into the medical catalogue, the two next subjects of consideration are their classification or arrangement; and the best mode of employing them, whether simply, and on account of their own specific virtues, or in connection with other substances, by which their proper qualities are so intermixed with the qualities of the other substances employed, as to acquire an increased, a diminished, or altogether a new action; and consequently to be productive of a different result.

The former consideration alone belongs, strictly speaking, to the present article; the latter constituting the proper subject of pharmacy or compound medicine. For the theory and practice, therefore, of combining and compounding medicinal substances, we refer our readers to the article PHARMACY; and shall here confine ourselves, as strictly as we may be able, to the materials actually employed in medicine, on account of their own supposed inherent virtues, and which for the most part are denominated *simples*.

What ought to be the classification of these materials? This is a question which has often been agitated, and almost as often answered in a different manner; whence the arrangement of different writers is as different as possible, as founded upon some supposed superior advantage, or even the mere fancy of the author himself. The most simple arrangement is that of an alphabetic form; and it has taken place in most of the dispensatories and pharmacopœias of modern times; but it conveys no practical information; indicates no specific virtue; communicates no scale of comparative power. Another arrangement is, that founded upon the quarter or the kingdom from which the material is derived; and of course under this system the materia medica is divided into the three grand classes of animal, vegetable, and mineral substances. Yet this arrangement does not appear to be of much more advantage than the preceding: the plan is even less simple; and the knowledge it communicates is too trivial to be of any importance. Another, therefore, and a better distribution is founded upon the sensible and more obvious qualities of the substances employed in medicine, from their being acid, absorbent, glutinous, unctuous, astringent, saccharine, acrid, aromatic, bitter, emetic, or cathartic. For this classification we are entitled to Cartheusen; it is highly ingenious, and so far as it is applicable, of considerable utility. But it labours under the defect of being incapable of general application. There are many simples, for example, and those even of great power and activity, in which we can distinguish no predominant sensible quality; there are many, again, in which various qualities are so equally united, that they have just the same claim to a position under one class or order as under another; and there are many, also, which though similar in their sensible qualities, are very dissimilar in their effects upon the animal frame. Thus though gentian and aloes agree in possessing a bitter taste, and sugar and manna in being sweet, their medical virtues are widely different. Accordingly Cartheusen himself is compelled to deviate occasionally from his general plan, and to found a part of his division on the medicinal effects of his materials; introducing not only a class of purgatives and emetics, but of vaporose inebriants and narcotics; under which last class he arranges tobacco, elder-flowers, saffron, opium, and poppy-seeds; substances, certainly, very discordant in all their qualities that relate to medicinal intentions.

The last division we shall notice is that of Vogel, who has classified his materials according to their effects on the human body. Some are found to have the property of rendering the solid parts of the frame more lax than before, and are hence denominated *relaxing* medicines; others possess a directly contrary power, and are consequently called *indurating* medicines. A third kind are found to excite inflammation in the part to which they are applied, and are therefore named *inflammatory;* while a fourth, from being perceived to increase or diminish the vigour of the body, or what is called the tone of the solids, have acquired the name of *tonics* in the first instance, and *sedatives* in the second. Some, again, are conjectured neither remarkably to increase nor diminish the tone of the solids; but to perform their office either by correcting some morbid matter in the body, or by evacuating it: in the former case they are called *alterants;* in the latter *evacuants.*

These are the general divisions or classes into which simple medicines are partitioned under this system; but when we begin to consider their virtues more particularly, a variety of inferior divisions must necessarily ensue. Thus, of the relaxing medicines, some, when externally applied, are

supposed merely to soften the part; and in such case are called *emollients;* while others, which are supposed to have a power of augmenting the disposition of the secernents of an inflamed part to the secretion of pus, are called *maturants* or *suppuratives.* Sedative medicines, that have the power of assuaging pain, are denominated *paregorics;* if they altogether remove or destroy pain, they are called *anodynes;* if they take off spasm, *antispasmodics;* if they produce quiet sleep, *hypnotics;* if a very deep and unnatural sleep, together with considerable stupefaction of the senses, *narcotics.* Tonic medicines, in like manner, obtain the name of *corroboratives, analeptics,* or *nervines,* when they slightly increase the contractile power of the solids; but of *astringents* or *adstringents,* if they do this in a great degree. Some of this order of medicines have been supposed to promote the growth of flesh, to consolidate wounds, and restrain hæmorrhages; and hence the names of *sarcotics* and *tranmatics,* or *vulneraries;* names, however, which may well be dispensed with, as the quality is very questionable, and perhaps altogether erroneously ascribed. Other astringents, again, are denominated *repellent, discutient, stimulant,* or *attractive,* according to the respective modes by which they are conceived to produce one common effect. Medicines of the inflammatory tribe, are, in like manner, divided into *vesicatories* or *blisters,* if by their application they raise watery bladders on the skin; *catheretics, escharotics,* or *corrosives,* if they eat into and destroy the substance of the solid parts themselves; and *rubefactive* or *rubefacient,* if possessed of less power than the vesicatories, they merely produce a redness on the part to which they are applied, by increasing the action of a part, and stimulating the red particles of the blood into vessels which do not naturally possess them. The alterant tribe is divided into *absorbents, antiseptics, coagulants, resolvents, calefiants,* and *refrigerants,* according to the peculiar mode by which the different individuals of this tribe are supposed to operate. The evacuants are generally subdivided from the nature of the humour they are supposed to discharge: *emetics* if they evacuate the contents of the stomach by vomiting; *cathartics* if they induce purging; *laxatives* if they produce a moderate discharge of feces without pain or sickness; *eccoprotics* if the discharge be greater, but still confined to the common nature of the feces themselves. Thus again they are named *diaphoretics,* if they promote the expulsion of humours through the pores of the skin with a small increase of action; *sudorifics* if the increase of action be greater, and the discharge more copious. Such as excite urine are called *diuretics;* such as produce evacuation from the glands of the palate, mouth, and salivary ducts, *salivating* medicines; those that promote the discharge of mucus from the throat *apophlegmatics;* those that evacuate by the nose, *ptarmics, errhines, sternutatories;* and those which promote the menstrual discharge, *emmenagogues.* To this order, also, some writers reduce those medicines which expel any preternatural bodies, as worms, stones, and flatus or confined air: of these the first are called *anthelmintics;* the second, and especially when directed to the bladder, *lithontriptics;* and the third *carminatives.*

Such is the general outline of those who have adopted this kind of system. But it must be obvious, that though the general outline be the same, it may submit to a great variety of modifications; and hence, again, the writers who have made choice of this system, and founded their classifications upon the effects produced by the articles of which they have treated upon the human body, have arranged it in various ways according to their respective ideas of superior utility or convenience. Hence the classes of Cullen amount to twenty-four; those of Darwin to not more than seven; while others have given us twelve, fourteen, or fifteen, according to their own fancy.

The twenty-four classes of Dr. Cullen are as follow:

| | |
|---|---|
| Astringents | Antacids |
| Tonics | Antalkalines |
| Emollients | Antiseptics |
| Corrosives | Errhines |
| Stimulants | Silagogues |
| Sedatives | Expectorants |
| Refrigerants | Emetics |
| Antispasmodics | Cathartics |
| Diluents | Diuretics |
| Attenuants | Diaphoretics |
| Inspissants | Menagogues. |
| Demulcents | |

The seven classes of Dr. Darwin are the ensuing:

| | |
|---|---|
| Nutrients | Invertents |
| Incitants | Revertents |
| Secernents | Torpents. |
| Absorbents | |

It will appear, even upon a superficial examination of the first of these classifications, that the first is unnecessarily diffuse: that some of the divisions might be introduced under one common head, as for example those of emollients and demulients; diluents and attenuants; and that for one or two of them there is little foundation in nature. We particularly allude, in this last instance, to the antalkalines, which are obviously only introduced as a sort of graceful contrast to the antacids; and concerning which the writer himself observes, "had it not been to give some appearance of system, and from my complaisance to Dr. Boerhaave, who treats *de morbis ex alkali spontaneo,* I should not have admitted of this chapter; for I am well persuaded that no alkaline salt, in its separate state, ever exists in the blood-vessels of the living human body." This is not the only instance, however, in which we find men of judgment and deserved reputation consenting to propagate errors, from the mere love of system, or from attachment to names of extensive celebrity. Happy would it be for us that all who thus act should avow their error like the author before us, and thus put the remedy by the side of the evil.

The classification of Dr. Darwin, however, labours under still stronger objections. Instead of being too diffuse, it is too contracted, for we may defy the warmest supporter of the Darwinian school to simplify and arrange the whole of what is included in the preceding classification, or that ought to be so included, under the present. But it has a fault still more prominent; and that is, it is adapted to an individual nosology, we mean the nosology of the author himself; and this a nosology which, in some of its divisions, is perhaps founded on mere fancy, and consequently has no chance of a permanent or general adoption. His *invertentia* and *revertentia* depend upon actions which, to say the least of them, are highly doubtful, and have for some years been gradually sinking into disbelief.

Between these two extremes, we have had a variety of arrangements of late years, one of the best of which, perhaps, is Dr. Kirby's, published in a

small tract, entitled, Tables of the Materia Medica, which, with a chemical and a miscellaneous division, consists of eighteen classes; but to both which we cannot but object; to the first, as it enters too deeply into the department of pharmacy for a mere list of the materials of medicine; and to the second, as evincing a carelessness or want of methodizing talent, which we should not have expected, and a total departure from every system whatever. We shall nevertheless avail ourselves of its general merit as far as we may be able, and endeavour to correct its deficiencies.

There is, however, another point to which we must advert before we proceed to our classification; and that is the nomenclature by which the different substances ought to be distinguished. Till of late, from the use of different nomenclatures by different colleges of medicine, and an absurd intermixture of several of them by some writers, the whole has been a scene of perplexity and confusion. Within the last six or seven years, however, a disposition has been progressively evinced to simplify and generalize the technology, and render the descriptions more accurate. The language of Linnéus has been resorted to as by common consent throughout the three kingdoms of animals, vegetables, and minerals; and though the chemical vocabulary of Lavoisier has not yet been generally introduced, it is daily gaining ground in the publications of individual writers, and has been admitted in its utmost latitude into one or two of our collegiate pharmacopœias. The College of Edinburgh, as it has long led the way as a medical school, has also taken the lead in this instance, and has the honour of having first composed a pharmacopœia in the pure and unmixed language of science, by its last edition, published in November 1804. The Dublin College has followed its example; and at length the College of London, stimulated by such noble incentives, has also roused itself, and re-edited its pharmacopœia, with a variety of modern improvements. The general nomenclature of this will not be found to vary essentially from the nomenclature of the Edinburgh pharmacopœia, and especially in that part of it which relates to the materia medica, the immediate object before us, excepting that the terms are for the most part materially abbreviated.

We freely confess our surprise that, from the errors resulting from a promiscuous use of weights and measures, nothing very decisive has been attempted by any of the pharmacopœias. It would have added largely to the reputation of the edition of the London College, if it had adopted the decimal and applicable menstruation of the French Institute, at the same time that it consented to admit the French nomenclature. It has not, however, been altogether inactive upon this subject, for it has exchanged the words *ounces* and *drams*, in the measurement of liquids, for *fluidounces* and *fluidrams*, *fluiduncia* and *fluidrachma*; and has altogether banished the word *drop (gutta)* as an indeterminate quantity, and has coined the term *minim (minimum)* as a substitute; meaning by minim or minimum the sixtieth part by measure of a fluidounce, in the same manner as a grain is the sixtieth part of an ounce solid: and glass measures are now manufactured, and may be had at any of the glass shops, properly graduated, for the purpose of ascertaining this minute proportion.

To this change we assent most heartily: the necessity is clear, and the term is elegant. *Fluidrams* and *fluidounces*, however, make a queer kind of compound; and if any thing of the sort were attempted, they should have been *liquidrams* and *liquidounces*, since the term liquid is now, by a kind of general consent among chemists, confined to express permanent fluids specifically (such as are uniformly intended in the pharmacopœia) while that of *fluid* is applied generically to denote gasseous, as well as permanent fluids.

Independently of these changes, we have to remark that the liquid *libra*, or pint, is now exchanged for the term *octarius*; and this also may have its advantage in occasionally preventing confusion, where the peculiar kind of libra is not sufficiently pointed out.

In glancing over the regulations of the Edinburgh College upon this subject, we perceive it has carried the point of simplicity to a still greater, perhaps to an inconvenient, and even culpable extent; for, apparently in utter despair of obtaining any thing like certain in measuring medicines, it has made a general proscription of this kind of graduation in every instance: so that in the Edinburgh forms the liquids of every sort are supposed to be employed by weight alone.

In the ensuing classification, we have been anxious to give our readers a general and concentrated view, as far as we have been able, not only of the substances employed, but of the form and preparation in which they are exhibited in the new editions of the three national pharmacopœias of London, Edinburgh, and Dublin. We may be told, perhaps, that we are hereby, in some measure, intrenching upon the province of pharmacy, properly so called. We are not insensible to the remark: but we hereby gain an advantage which no other plan could present to us; we offer at one and the same time a table of comparative statements, and shew the various forms in which the same material becomes an officinal drug. We have also been anxious to exhibit, in every instance, a glance at the common dose for adult age, as well as to specify, in terms as abbreviated as possible, the name of the country in which the different articles exist indigenously; the part or organ of the substance employed; and the disease in which it is supposed to be efficacious. The classification is as follows; and every class is subdivided, as far as possible, into an animal, a vegetable, and a fossile section.

| | |
|---|---|
| Emetics | Refrigerants |
| Expectorants | Astringents |
| Diaphoretics | Tonics |
| Diuretics | Stimulants |
| Cathartics | Antispasmodics |
| Emmenagogues | Narcotics |
| Errhines | Anthelmintics |
| Sialagogues | Absorbents |
| Emollients | |

## CLASS I. EMETICA.

### SECT. I. ANIMALIA.

Murias Ammoniæ. Edin. Lond.
Sal ammoniacum. Dub.
Britannia.
Aq. carbonatis ammoniæ. E.
Liquor ammoniæ carbonatis. L.
Liquor alkali volat. mitis. D.
} dr. 1—2.

### SECT. II. VEGETABILIA.

Anthemis nobilis. E. L. D.
Brit. Flos. Infus. dr. 2—4. ad. aq. lib. ½.

Asarum europæum. E.
Asarum. L. D.
Brit. Ital. Folia. Pulv. dr. ½—1.
Centaurium. L.
Insul. græc. Folia. infus. vel decoct.
Callicocca ipecacuanha.
Ipecacuanha. L. E. D.
India occid. Brasil. Radix. Pulv. gr. 15—25.
Vinum ipecacuanhæ. L. E. D. unc. 1—2.
Nicotiana Tabacum. E.
Tabacum. L.
America. Folia. Fum. Cataplasm.
Olea europæa. E.
Oliva. L. D.
Europ. merid. Fructus oleum express.
Ad Venena.
Scilla maritima. E.
Scilla. L. D.
Eur. merid. Rad. Pulv. gr. 4—10.
Acetum. Scillæ marit. E.
Acet. scillæ. L. D. unc. ½—1.
Sinapis alba. E.
Sinapi. L. D.
Brit. Seminis pulvis aqua commixt. dr. 1.

SECT. III. FOSSILIA.

Sulphas Cupri. E. L.
Cuprum vitriolat. D.
Brit. Solut. gr. 2—5.
Ad Venena.
Sulphuretum antimonii. E. L.
Antimonium. Stibium. D.
Brit.
Oxidum Antimonii. L.
Oxidum Antimonii cum Sulphur. vitrificat. E.
Antimonium vitrificatum. L.
Tartris Antimonii. E. } gr. 1—4. dos. repetit.
Antimonium tartarisatum. L. }
Tartarum Stibiatum. D. }
Vinum Tartrit. Antimon. E. unc. ½—1½.
Antimon. tartar. L.
Tartari stibiat. D. dr. 2—6.
Zincum E.
Sulphas Zinci E. L. } gr. 10—30.
Zincum vitriolatum. D. }

## CLASS II. EXPECTORANTIA.

SECT. I. VEGETABILIA.

Callicocca Ipecacuanha. Pulv. gr. 1. 3tia aut 4ta qu. hor.
Peripneumon. noth. Asthma.
Nicotiana Tabacum. Fumus.
Scilla maritima.
Acet. Scil. maritim. dr. 2—4.
Syrup Scill. maritim. E.
Oxymel Scillæ. L. D.
Tinctura Scillæ. L. gt. 10—dr. 1.
Pilulæ Scillæ. L. D. } gr. 10—15.
Scilliticæ. E. }
Allium sativum. E.
Tinctur. Aristoloch. Serpentar. E. } dr. 3—6.
Serpentar. L. }
Daphne Mezereum. E.
Mezereum. L.
Mezereon. D.
Eur. septentr. Radicis cortex. Pulv. gr. 1.
Decoctum Daphnes Mezerei. E. unc. 1—2.
Syphil. Morb. cutan.
Dorstenia Contrajerva. E.
Contrajerva. L.
Contrajerva. D.
Amer. merid. Rad. Pulv. gr. 30—40.
Decoct.
Febr. Cynanch.
Pulv. Contrajerv. comp. L. gr. 30—40. 4ta. qu. hor.
Fumaria officinalis.
Fumaria. D.
Brit. Herba. Infus.
Laurus Sassafras. E.
Sassafras. L. D.
Amer. sept. Ling. Rad. Cort. Decoct.
Salvia officinalis. E.
Salvia. D.
Eur. mer. Folia. Infus. ad libitum.
Sambucus nigra. E.
Sambucus. D.
Brit. Baccæ. Succus expressus.
Smilax Sarsaparilla. E.
Sarsaparilla. L. D.
Ind. Occ. Rad. Decoct.
Decoctum Smilac. Sarsaparill. E. } lib. 1.—in die.
Sarsaparill. L. D. }
compos. L. Ibid.
Ad morbos cutan.
Solanum Dulcamara. E.
Dulcamara. E.
Brit. Stipites. Decoct.
Supertartris Potassæ. E.
Crystalli Tartari. D.
Gallia, &c. Pulv. Solut. scr. 1—dr. 1. sæpius in die.

### B. *Fortiora.*

SECT. I. ANIMALIA.

Moschus moschiferus. E.
Moschus. D.
Asia. Mætries prope Umbilic. collecta. Bol.
Haust. gr. 10—20.
Mistura moschata. L. unc. 1—2.

SECT. II. VEGETABILIA.

Aconitum neomontanum.
Aconitum napellus. L. E. D.
Eur. mer. Folia. Pulv. Tinctur. gr. ½—2.
Succus spissat. Aconit napell. E. gr. ½—2.
Rheumat. Podagr. Paralys.
Guaiacum officinale. E.
Guaiacum. L. D.
Ind. Occ. Ling.
Cort. Dec. Gum-resin. Pulv. Pil. Emuls. gr. 10—30.
Decoct. Guaiaci offic. comp. E. lib. ½—1. in die.
Ad. morb. cutan.
Tinctur. Guaiac. offic. dr. 2—4.
Ammoniæ. E. } dr. 1—3.
Guaiaci. L. }
Volatilis. D. }
Rheumatism.
Laurus Camphora. E.
Camphora. L. D.
Ind. Orient. Bol. Mist. gr. 5—20.
Mistura Camphorata. L. unc. 2—4.
Emulsio Camphorata. E. unc. 1—3.
Papaver somniferum. E.
Papaver. L.
Pap. album. D.
Opium.
Asia. Succus spiss. capsul. Pil. Pulv. gr. 1—2.
Tinctura Opii. L. E. D. gt. 25—50.
Tinct. Camphoræ Comp. L. dr. 2—6.

Ammoniata. E. dr. 1—1½.
Pulv. Ipecac. et Opii. E. } gr. 10—20.
compos. L. D.
Rhododendron Chrysanthum. E.
Siberia. Fol. Summit. Decoct. dr. 2—4. ad lib. 7.—unc. 1—2. bis in die.
Rheumat. Podagr.

SECT. III. FOSSILIA.

Sulphuretum Antimonii.
Liquor Antim. Tart. L. dr. 1.
Tartris Antimonii gr. ¼. 6ta qu. hora.
Vinum Tartrit. Antimon. E. dr. 2.
Sulphuret. Antimon. præp. gr. 1—2.
Sulphur Stibii fuscum. D. Gr. 1—1½.
Oxidum Antimon. cum phosphate Calcis. E. } gr. 4—6. 4ta aut 6ta quaq. hor.
Pulvis Antimonialis L.
Stibiatus D.
Oxydum Antimonii. L. gr. 10—15.
Calx Stibii præcipitat. D.
Febres. Cynanchen. Pneumon. Rheumat. Variol. Rubeol. Scarlatin. Catarrh.
Dysenter, &c.
Sulphur sublimatum.
Sulph. sublimat. lat E. } gr. 12—30.
præcipitat. L.
Allium. L. D.
Eur. merid. Rad. recens. dr. 1—2.
Syrupus Allii. L. coch. 1. subinde.
Ammoniacum. E. L. D.
India. Gum-resin. Pil. Mist. gr. 10—20. dos rep.
Lac Ammoniaci. L. unc. 1—2. dos rep.
Arum maculatum. E.
Brit Rad. recens.
Conserv. Ari. L. dr. ½—1.
Colchicum autumnale. E.
Colchicum. L.
Brit. Rad. recens.
Syrupus Colchici autumnal. E. dr. 2—unc. 1.
Ferula Asa fœtida. E.
Asa fœtida. L. D.
Persia. Gum-resin. Pil. mist. gr. 10—15. dos rep.
Mist. Asæ fœtidæ. L. unc. 1—2. dos. rep.
Hyssopus officinalis.
Hyssopus. D.
Brit. Herba.
Marrubium vulgare. L.
Brit. Folia. Syrup.
Myrrha. L. E. D.
Arab. Abyssin. Gum-resin. Pul. Pil. gr. 10—dr. ½.
Pimpinella Anisum. E.
Anisum. L. D.
Asia. Semin. Infus.
Ol. volat. Pimpinell. Anisi. E.
Essent Anisi. L. gr. 2—6.
Polygala Senega. E.
Senega. L. D.
Amer. Rad.
Decoctum. Polygal. Senegæ. E. unc. 1—1½.
Cynanch. tracheal. Pneumon.
Styrax Benzoin. E.
Benzoinum. D. L.
Sumatra. Balsam.
Acidum Benzoicum. E. L.
Sal Benzoini. D. gr. 1—2. dos. repet.
Tinct. Benzoini comp. L. gt. 15—30.
Alcohol.
Spirit. rect. L.
Spirit. Vini rectificat. D.
Æther Sulphuricus. E. L. } forma vaporis.
vitriolicus. D.
Asthma.

SECT. II. FOSSILIA.

Liquor Antimonii tartarisati. L.
Sulphuretum Antimonii. E.
Tartris Antimonii. gr. ⅓—½. subinde.
Vinum Tartrit. Antimonii. E. dr. 1—2.
Antimonii tartaris. D. gt. 30—d. 1.
Sulphuretum Antimonii precipitat. E*. L.
Stibii rufum. D. gr. 3—5.
Sulphur sublimatum. E.
Flores Sulphuris. L. D.
Sulphur sublimat. lotum. E. L. } gr. 15—dr. ½.
Flores Sulphuris loti. D.
Oleum Sulphuratum. L. D. E. gt. 10—20.
Petroleum Sulphuratum. E.
Asthma, &c.

* This should have been called *Hydrosulphuretum.*

## CLASS III. DIAPHORETICA.

### A. *Mitiora.*

SECT. I. ANIMALIA.

Murias Ammoniæ.
Aqua Carbonat. Ammoniæ. gt. 50.
Carbonas Ammoniæ. E. L. } gr. 5—10.
Alkali volatile mite. D.
Alcohol Ammoniatum. E.
Spirit. Ammoniæ. L. } gt. 30—dr. 1.
Alkali volatil. D.

SECT. II. VEGETABILIA.

Anthemis nobilis.
Infus. calid.
Centaurea Benedicta.
Ibid.
Myrrha.
Pulv.
Allium sativum.
Acidum Acetosum.
Acetum. L. D.
Serum lactis Aceto coacti.
Rheumatism.
Acidum Acetosum distillat. E.
Acidum aceticum. L.
Acetum distillatum. D.
Aqua Acetitis Ammoniæ. E. } dr. 3—6.
Liq. Ammoniæ acetatis. L.
Liq. Alkali volat. acetat.
Arctium Lappa. E.
Bardana. D.
Brit. Rad. Decoct.
Artemisia Abrotanum.
Eur merid. Folia. Infus.
Aristolochia Serpentaria. E.
Serpentaria. L. D.
Americ. Rad. Pulv. gr. 20—30. 6ta quaq. hor.
Hydrargyrum.
Hydrargyrus. L. E. D.
Hungaria, &c.
Hydrargyr. purificat. E. D.
Submurias Hydrargyr. E. L. } gr. 1. omn. nocte.
Hydrarg. muriat. mit. sublim. D.
Rheumat.

## CLASS IV. DIURETICA.

### SECT. I. ANIMALIA.

Lytta vesicatoria.
Lytta. L.
Meloe vesicatoria. E.
Cantharis. D.
Eur. mer. Pulv. gr. $\frac{1}{2}$—1. 4ta vel 6ta qu. hor.
Tinctur. Meloes vesicat. E.
Lyttæ. L. gt. 10—20.
Ischur. Hydrop.
Oniscus Asellus. E.
Brit.

### SECT. II. VEGETABILIA.

Asarum europæum. Rad. Decoct.
Hydrop.
Nicotiana Tabacum. Infus. unc. 1. ad lib. T. gt. 60—80.
Hydrop. Dysur.
Scilla maritima. Pulv. gr. 1—2. bis terve in die.
Tinctur. Scilæ. gt. 20—30.
Hydrop.
Allium sativum.
Colchicum autumnale.
Syrup. Colchici. E. } dr. 1—4. bis terve in die.
Acetum Colchici. D. }
Hydrop.
Polygala Senega.
Decoct. Polygal. Seneg. unc. 1—1$\frac{1}{2}$.
Acidum Acetosum.
Acetis Potassæ. E. }
Potassæ acetas. L. } scr. 1—4.
Alkali vegetabile acetat. }
Hydrop. Icterum.
Daphne Mezereum.
Decoct. Daphn. Mezerei. unc. 1—3.
Smilax Sarsaparilla.
Decoct. Sarsaparill. com. ad libit.
Solanum Dulcamara. Decoct.
Supertartris Potassæ Solut. unc. $\frac{1}{2}$. in die.
Hydrop.
Allium Cepa.
Cepa. D.
Cult. Rad. recens ad libit.
Cissampelos Pareira.
Pareira brava. D.
Ind. Occid. Rad.
Cochlearia Armoracia. E.
Armoracia. L.
Raphanus rusticanus. D.
Brit. Rad. recens. Infus.
Hydropes.
Copaifera Officinalis. E.
Copaiba. D. L.
Ind. Occ. Amer. Resin. Gutt. Emuls. gtt. 20—60.
Cynara Scolymus.
Cin. Scolymus. E.
Cinara. D.
Eur. mer. Folia. Succ. express. unc. $\frac{1}{2}$—1. bis in die.
Hydrop.
Digitalis purpurea. E.
Digitalis. L. D.
Brit. Fol. Pulv. gr. 1. bis in die. Infus. Decoct.
Hydrop.
Juniperus communis.
Juniperus. L. D.
Brit. Bacc. scr. 1—dr. $\frac{1}{2}$. Cacumen. Infus. ad libit.
Spir. Juniper. commun. comp. E. } unc. $\frac{1}{2}$—1. dilut.
compos. L. D. } subind.
Ol. Juniper. L. D.
commun. E.
Juniperus Lycia.
Olibanum. L. D.
India. Gum-resin.
Leontodon Taraxacum.
Taraxacum L. D. Rad.
Pinus Sylvestris. E.
Terebinthina vulgaris. L. D.
Brit. Resina et ol. volat. Gutt. Enema. Pill. gr. 15—20.
Ol. Volat. Terebinth rect. gtt. 20—30.
Pinus Larix.
Terebinthina Veneta. D.
Brit. Resina. Enema. Pill.
Pistachia Terebinthus.
Terebinthia Chia. L.
Spartium scoparium. E. L.
Spartium. L.
Genista. D.
Brit. Sem. Cacum. Decoct. ad libit.
Ulmus campestris. E.
Ulmus. L. D.
Brit. Cort. intern. Decoct.
Decoct. Ulmi. L. unc. 4—8. sæpius in die.
Ad morb. cutan.

### SECT. III. FOSSILIA.

Hydrargyrum.
Murias Hydrargyri. E. }
Hydrargyri oxymurias. L. } gr. $\frac{1}{8}$—$\frac{1}{4}$.
Hyd. mur. corros. D. }
Ad morb. cutan.
Nitras Potassæ. E. L.
Nitrum. D.
India. Pulv. gr. 5—15.
Nitrum purificat. E. u. s.
Acidum Nitrosum. E. D. dr. 1—2.
Acidum nitricum. L. dr. $\frac{1}{2}$—1. ad Aquæ lib. 1. in die.
Spir. æther. nitros. L. E. D. gtt. 30—60. sæp. in die.

## CLASS V. CATHARTICA.

### A. *Mitiora.*

### SECT. I. ANIMALIA.

Mel. L. E. D.
Brit.
Mel despumatum. E. L. D.

### SECT. II. VEGETABILIA.

Anthemis nobilis.
Decoct Anthemid. nobil. E. Enema.
Olea europæa. Oleum. Enema.
Supertartris Potassæ. Pulv. dr. 2—4.
Tartris Potassæ. E. L. }
Alkali vegetabile tartarisat. D. } dr. 2—6.
Tartris Potassæ et Sodæ. E. }
Soda tartarisata. L. } unc. 1—2.
Sal Rupellense. D. }
Ad Febres. Phlegmas. Hæmorrhag. Comata. Colicam.
Choleram. Hydropes. Icterum.
Cassia fistula. E.

Cassia. L.
C. fistularis. D.
Ind. Or. et Occ. Fruct. Pulpa. ad libit.
Electuar. Cassiæ. L. fistul. E. } unc. $\frac{1}{2}$—1.
C. Senna. E.
Senna. L. D.
Ægypt. Folia. Pulv. Infus.
Pulvis Sennæ composit. L. dr. $\frac{1}{2}$—1.
Febres, &c.
Confectio Sennæ. L.
Electuar. Cassiæ Sennæ. E. Sennæ. D. } dr. 2—6.
Infusum Sennæ. Simpl. L. Sennæ. D. } unc. 1—3.
Infus. Tamarind. Indic. cum Cass. Senna E. unc. 1—3.
Tinctura Sennæ. comp. E.
Sennæ. L. D. unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Colicam.
Ficus Carica.
Carica. L. D.
Eur. mer. Fruct.
Fraxinus Ornus. E.
Manna. L. D.
Eur. mer. Succ. concret. Solut. Elect. unc. 1—1$\frac{1}{2}$.
Syrupus Mannæ. D.
Prunus Domestica. E.
Pr. Gallica. L. D.
Eur. mer. Fruct. ad libit.
Rosa Damascena. D.
Rosa centifolia. E. L.
Eur. mer. Petala.
Aq. Rosæ centifolia. E.
Rosæ. L. D.
Syrup. Rosæ. centifol. E.
Rosæ. L. D.
Saccharum officinale. E.
Sacch. pur. L.
Sacch. non. purificat. D.
Ind. Occid. Succ. spissat.
Tamarindus Indicus. E.
Tamarindus L. D.
Ind. Occ. Fruct. Pulpa. unc. 1—2. Infus.
Viola odorata. E.
Viola. L. D.
Brit. Petala. Infus.
Syrupus Violæ odoratæ. E.
violæ. L. D.

SECT. III. FOSSILIA.

Sulphur sublimatum.
Sulphur. sublimat. lotum. dr. 1—2.
Ad Hæmorrhag. Morb. cutan. Obstipat.
Sapo Hispanus. E. D.
Sapo durus. L.
Hispan. Pil. Enema.
Icterum.

B. *Fortiora.*

SECT. I. ANIMALIA.

Cervus Elephus. E.
Cornu cervinum. D.
Cornua. L.
Phosphas Calcis.
Phosphas Sodæ. E. unc. 1—2.

SECT. II. VEGETABILIA.

Nicotiana Tabacum. Fum. Infus. pro Enemat.
Colicam Obstipat.
Sambucus nigra. Cortex interior Decoct. unc. 1. ad lib. 1. in die.
Hydrop.
Pinus sylvestris Larix. } Terebinthina Enemat.
Aloe perfoliata. E.
Aloe Soccotrina.
A. Hepatica.
A. Cabalina. E. D.
Aloe spicata. L.
A. vulgaris. L.
Asia. Ind. Occ. Africa. Gum-resin. Pil. gr. 5—20.
Pulv. Aloes cum Canella. L. gr. 8—20.
Pilulæ Aloeticæ E. D. Aloes compos. L. } gr. 10—20.
Aloes cum Colocynth. L. gr. 10—20.
Vinum Aloes Soccotrin. E. unc. 1—2.
Aloes. L. Aloetic. D. unc. $\frac{1}{2}$—1.
Tinctura Aloes socotrin. E. Aloes. L. } unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Dyspeps. Hypochondrias. Chloros.
Icter. Obstipat.
Bryonia alba. E.
Bryonia. D.
Brit. Rad. Decoct. Pulv. scr. 1—2.
Maniam. Hydrop.
Convolvulus Jalapa. E.
Jalapa. D. L.
Amer. Rad. Pulv. Bolus. gr. 15—30.
Pulvis Jalapæ compos. E. dr. $\frac{1}{2}$—1.
Extract. Rad. Convolvul. Jalapæ. E. Jalapæ. L. } gr. 5—12.
Tinctur. Convolvul. Jalapæ. E. dr. 3—6.
Tinctur. Jalapæ. L. Jalapæ. D. dr. 2—4.
Conv. Scammonium. E.
Scammonea. L.
Scammonium. D.
Asia. Resin. Pulv. Bol. Pil. gr. 5—15.
Pulvis Scammon. comp. L. gr. 8—15.
E. gr. 10—30.
Electuar. Scammonii. L. D. gr. 15—30.
Hydrop. Vermes.
Cucumis colocynthis. E.
Colocynthis. L. D.
Syria. Fructus medulla. Pil. Bol. gr. 2—5.
Extract. Colocynth. comp. L. gr. 5—15.
Gratiola officinalis E.
Gratiola. D.
Eur. mer. Herba. Radix. Decoct. Pulv. gr. 15—30.
Helleborus niger. E. D.
Melampodium.
Eur. mer. Rad. Pulv. Pil.
Extract. Hellebor. nigri. E. gr. 3—6.
Hydrop.
Helleb. fœtidus.
Helleborus. L.
Brit. Rad. Fol. Decoct.
Iris Pseudacorus.
Iris. D.
Brit. Rad. recens. Succ. express. gtt. 60—80.
Hydrop.
Linum catharticum. D.
Brit. Herba. Infus. Pulv. dr. 1.
Momordica Elaterium. E.
Brit. Fructus recens.
Succ. spiss. Momordic. Elater. E. } gr. 1—3.
Hydrop.
Rhamnus Catharticus. E.
Rhamnus. L.

Brit. Bacca. Succ. express.
Syrupus Rhamni cathart. E. L. dr. 6—12.
Hydrop.
Rheum palmatum. E.
Rheum. L.
Rhabarbarum. D.
Russia. Ind. Rad. Pulv. Bol. Pil. gr. 10—40.
Infusum Rhei palmati. E. unc. 1—3.
Vinum Rhei palmati. E. dr. 2—6.
Tinctura Rhei palmat. E. } unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Rhei. L.
Rhei comp. L. unc. 1.
Rhei et Aloes. E. dr. 4—6.
Gentian. E. dr. 4—6.
Febres. Dysenter. Dyspeps. Hypochond. Icterum.
Ricinus communis. E. D.
Ricinus. L.
Ind. Occ. Seminum Ol. express. dr. 3—unc. 1.
Stalagmitis Cambogioides. E.
Cambogia. L.
Gambogia. D.
Ind. Gum-resin. Pil. g. 3—15.

SECT. III. FOSSILIA.

Sulphuretum Antimonii.
Tartris Antimonii gr. $\frac{1}{4}$ 4ta. quaq. hor.
Dysenter.
Hydrargyrum.
Submurias Hydrargyri. gr. 1—4.
Submurias Hydrargyri præcipitat. E.
Hydrarg. mur. mit. præcip. D. } gr. 3—10.
Pilulæ Hydrargyri. E. D. L.
Phlegmas. Comata. Colicam. Icterum. Obstipat. &c.
Nitras Potassæ.
Sulphas Potassæ. E. L.
Alkali vegetabile vitriolat. D. } dr. 1—2.
Murias Sodæ. E.
Sodæ sulphas. L.
Alkali fossile muriatum. D.
Brit. Solut. unc. $\frac{1}{2}$—1. Enem.
Sulphas Sodæ. E.
Alkali fossile vitriolat. D. } unc. 1—2.
Sulphas Magnesiæ. E. L.
Magnesia vitriolat. D.
Brit. Solut. Enem. unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Dysenter, &c.

## CLASS VI. EMMENAGOGA.

SECT. I. ANIMALIA.

Murias Ammoniæ.
Carbonas Ammoniæ.
Castor Fiber. E.
Castor. L. D.
Russia Amer. Mater. prope anum collecta.
Pulv. Pil. gr. 10—20. Enem. scr. 2—dr. 1.
Tinctura Castor. L. E. D. gtt. 20—dr. 1.
compos. E. gtt. 20—dr. 1.

SECT. II. VEGETABILIA.

Anthemis nobilis. Pulv. Infus. fort.
Extract. Anthem. nobil. E.
Anthem. L. } gr. 15—30.
Chamæmel. D.
Ammoniacum. Pil. gr. 10—scr. 1.
Ferula Asa fœtida. Pil. gr. 10—20.
Pil. Asæ fœtid. comp. E. gr. 15—30.
Tinctur. Assæ fœtid. L. E. D. dr. 1—2.
Alcohol. Ammoniæt. fœtid. E.
Spir. Ammoniæ fœtid. L.
Alkal. volatil. fœtid. D. } gtt. 30—dr. 1.
Marrubium vulgare. Infus.
Myrrha.
Solanum Dulcamara.
Aloe perfoliata. Pil. gr. 1. ter in die.
Pulv. Aloes cum Myrrh. L. gr. 15—30.
Pil. Aloes comp. L. gr. 8—15.
E. gr. 5—12.
cum Asa fœtida. E. gr. 10. bis in die.
Tinctura Aloes compos. L. unc. 1.
Bryonia alba. Pulv. gr. 10—20.
Helleborus niger.
Tinctura Hellebor. nigr. E. dr. 1. bis in die.
Rheum palmatum. Pulv. gr. 5—10. bis in die.
Pilul. Rhei compos. scr. 1—dr. $\frac{1}{2}$.
Arnica montana. E.
German. Flores. Infus. scr. 1—2. in die.
Bubon Galbanum. E.
Galbanum. L. D.
Afric. Gum resin. gr. 10—20.
Pilul. Galbani compos. gr. 15—30.
Juniperus Sabina. E.
Sabina. L. D.
Asia. Fol. Pulv. gr. 10—15. bis in die.
Extract. Sabinæ compos. D. gr. 5—10. bis in die.
Pastinaca Opopanax. E.
Opopanax. L. D.
Eur. mer. Gum-resin. Pil.
Rosmarinus officinalis. E.
Rosmarinus. L. D.
Eur. mer. Summitat. Infus.
Rubia tinctorum. E.
Rubia. L. D.
Brit. Zealand. Rad. Pulv. dr. $\frac{1}{2}$—1. ter in die.
Ruta graveolens.
Ruta. L. D.
Eur. mer. Herba. Infus.
Extract. Rutæ. D.
Sagapenum. E. D.
Ægypt. Gum-resin. Pil.

SECT. III. FOSSILIA.

Hydrargyrum.
Submurias. Hydrargyri. gr. 3—5.
præcip. gr. 5—10.
Pilulæ Hydrargyr. gr. 10—20.
Ferrum. E. L. D.
Brit., &c.
* Carbonas Ferri. E. L.
Rubigo Ferri. D. } scr. 1—dr. 1. bis in die.
Carbonas Ferri præcip. E. gr. 5—15.
Aqua Ferri Ærati. D. lib. $\frac{1}{2}$—1. in die.
Sulphas Ferri. E. L.
Ferrum vitriolat. D. } gr. 1—5. bis in die.
Vinum Ferri. L. dr. 2—4.
Tinctur. Muriatis Ferri. E.
Ferri muriat. D. } gtt. 10—20. bis terve in die.

* The quantity of Carbonic Acid in these two preparations can scarcely entitle them to the name of Carbonate; they are rather Carbonated Oxyd, or what Dr. Thomson calls Oxy-carbonates.

## CLASS VII. ERRHINA.

SECT I. VEGETABILIA.

Asarum europæum. Pulv.
Pulvis Asari europ. compos. E.

Nicotiana tabacum. Pulv.
Rosmarinus Officinalis. Pulv.
Iris florentina.
Ital. Rad. Pulv.
Lavandula spica. E.
Lavandula. L.
Lavendula. D.
Eur. mer. Flores. Pulv.
Origanum majorana. E.
Origanum. L.
Majorana. D.
Eur. mer. Folia. Pulv.
Teucrium marum.
Eur. mer. Herba. Pulv.
Veratrum album. E.
Veratrum. L.
Helleborus albus. D.
Eur. mer. Rad. Pulv.

SECT II. FOSSILIA.

Hydrargyrum.
Subsulphas Hydrarg. flav. E. } gr. 1. bis in
Hydrargyr. vitriolat. D. } die.

## CLASS VIII. SIALAGOGA.

SECT. I. VEGETABILIA.

Daphne Mezereum. Rad. masticat.
Odontalg. Paralys.
Amomum Zingiber. E.
Zingiber. L. D.
Ind. Occ. Rad. masticat. Infus.
Odontalg.
Anthemis Pyrethrum. E.
Pyrethrum. L. D.
Eur. mer. Rad. masticat. Infus.
Pistacia lentiscus. E.
Mastiche. L.
Mastacia. D.
Eur. merid. Resina. Masticat.

SECT. II. FOSSILIA.

Hydrargyrum.
Hydrargyrum purificatum.
Submurias Hydrargyri. gr. 1—2. bis in die.
Murias Hydrargyri. gr. $\frac{1}{8}$—$\frac{1}{4}$. bis terve in die.
Submurias Hydrarg. præcip. gr. 2. bis in die.
Pilulæ Hydrargyri. gr. 6—8. bis in die.
Oxidum Hydrargyri cinereum. E. } gr. 2. bis in
Pulvis Hydrargyri cinereus. D. } die.
Unguentum Hydrargyr. E. scr. 4. } alternis vel
fortius. L. D. scr. 2. } singulis
mitius. L. D. } noctibus.
Hydrargyr. oxyd. rubr. L. gr. $\frac{1}{2}$. bis in die.
Acetis Hydrargyria. E. } gr. 2.
Hydrargyr. acetatum. D. }
Hydrargyrus sulphuret. rubr. L. externe.
Sulphuretum Hydrargyri nigrum.
Hydrargyr. sulphuratus niger. D.
Ad Febrem flav. Phrenit. Hydrocephalic. Ophthalm.
Cynanch. tracheal. Hepatit. chronic. Comata. Tetanum.
Hydrophob. Hydrop. Chloros. Siphilid. Lepr. Icterum. Psoram. Vermes.

## CLASS IX. EMOLLIENTIA.

SECT. I. ANIMALIA.

Acipenser Huso. Sturio, &c. E.
Icthyocolla. L. D.
Russia. Decoct. ad libit.
Ovis Aries. E.
Sevum. L.
Sevum ovillum. D.
Brit. Ungt. Liniment. Cerat.
Physeter macrocephalus. E.
Cetaceum. L.
Sperma Ceti. D.
Sevum. Unguent, &c.
Sus scrofa. E.
Adeps suillum. D.
Adeps. L.
Brit. &c. Adeps. Unguent, &c.
Linimentum simplex. E.
Unguentum simplex. E.
Unguentum spermatis Ceti. D.
Cetacei. L.
Ceræ. D.
Ceratum simplex. E.
Spermatis Ceti. D.
Cetacei. L.
Cera alba. et flava. E. L. D.
Brit. Emuls. Unguent, &c.
Ad Diarrhœam. Dysenter. Ulcera.

SECT. II. VEGETABILIA.

Olea europæa. Liniment, &c. et interne.
Althea officinalis. E.
Althea. L. D.
Brit. Rad. Decoct. ad libit.
Decoct. Altheæ officinal. E. ad libit.
Syrupus Altheæ. E. L.
Amygdalus communis. E.
Amygdal. dulc. et amar. L. D.
Eur. mer. Fructus nucl. et Ol. express.
Emulsio Amygdali communis. E. } ad libit.
Lac Amygdalæ. D. }
Mist. Amygd. L.
Ad Febres. Pneumon. Catarrh, &c.
Oleum Amygdali communis.
Astralagus Tragacantha. E.
Tragacantha. L. D.
Eur. mer. Gummi. Pulv. Solut. ad libit.
Mucilago Astragali Tragacanthæ. E.
Mucilag. Gum. Tragacanthæ. D.
Pulvis Tragacanthæ comp. L. dr. 1—4.
Avena sativa. E.
Avena. L. D.
Cult. Semen. Decoct. ad libit.
Febres. Pneumon. Catarrh. Dysenter. Diarrhoea, &c.
Cocos Butyracea. E.
Amer. merid. Oleum nucis fixum.
Externe.
Eryngium maritimum. E.
Eryngium. D.
Brit. Rad. recens.
Glycyrrhiza glabra. E.
Glycyrrhiza. L. D.
Eur. mer. Rad. Pulv. Decoct. Succ. spissat.
Trochisci Glycyrrhiz. E. D. ad libit. Catarrh, &c.
Hordeum distichon. E.
Hordeum. L. D.
Cult. Semen. Decoct. ad libit.
Ut Avena.
Decoctum Hordei distichi. E. }
compositum } ad libit.
L. }
Lilium candidum.
Lilium album. D.
Cult. Rad. recens. Catapl.

Linum usitatissimum. E. L.
Cult. Semen. Infus. Ol. express.
Oleum Lini usitatiss. E. unc. 1—3. Lini. L. D.
Pneumon. Nephrit. Dysenter. Hæmopt.
Malva sylvestris. E.
Malva. L. D.
Brit. Folia. Decoct.
Decoctum Malvæ comp. L.
Melissa officinalis. E.
Melissa. D.
Cult. Herba. Infus.
Mimosa nilotica. E.
Acacia. L.
Gummi Arabicum. D.
Arab. Senegal. Gum. Pulv. Solut. ad libit.
Mucilago Mimosæ niloticæ. E. } ad libit.
Acaciæ. L.
Arabici Gummi. D.
Emulsio Mimos. nilot. E.
Arabica. D.
Trochisci Gummosi. E.
Catarrh. Pneumon. Diarrh. Blenorrh.
Pyrus Cydonia. E.
Cydonia. L.
Cult. Semen.
Decoctum Cydoniæ. L.
Sarcocolla.
Asia succ. spissat.
Triticum hibernum. E.
Amylum. L.
Cult. Semen.
Mucilago Amyli. E. D. ad libit.
Vitis vinifera. E.
Vitis. D.
Fruct. sicc. Uvæ passæ.
Decoct. ad libit.

## CLASS X. REFRIGERANTIA.

### SECT. I. VEGETABILIA.

Acidum Acetosum dilutem ad libit. extern.
Acetis Potassæ. dr. 2. ad aq. lib. 1 in die.
Aque Acetitis Ammoniæ, unc. ½. freq.
Febres. Phlegmas.
Supertartris Potassæ solut. ad libit.
Tamarindus Indica.
Fructus ad libit.
Febres.
Berberis vulgaris.
Berberis. D.
Brit. Fructus.
Febres.
Citrus medica. E.
Limones. L.
Limonium. D.
Eur. mer. et Ind. Occ. Fruct. succ. rec. et crystall.
Syrup. Citri. medic.
Limonii. D.
Limonis. L.
Febres.
Citr. Aurantium. E.
Aurantium. L.
Aurantia. D.
Eur. mer. Fruc. succ. recens.
Cochlearia officinalis. E.
Cochlearia. D. C.
Brit. Herba. et succus.
Succ. Cochlear. comp. E. ad libit.
Ad Scorbutum.
Morus nigra.
Morus. L.
Cult. Fructus.
Syrupus Mori. L.
Oxalis Acetosella,
Acetosella. D.
Brit. Herba. Succ.
Conserv. Acetosellæ. D.
Ribes nigrum. D.
Brit. Fruct.
Ribes rubrum. D.
Brit. Fructus.
Rosa canina. E. L.
Brit. Fruct.
Conserva Rosæ caninæ. E.
Confectio Ros. Canin. L.
Rubus Idæus. D.
Brit. Fructus.
Syrup. Fruct. Rub. Idæi. D.
Rumex Acetosa. E.
Acetosa. D. L.
Brit. Folia.
Sisymbrium Nasturtium. E.
Nasturt. aquatic. D.
Brit. Herba.
Ad Scorbutum.
Veronica. Beccabunga.
Brit. Herba.
Ad Scorbutum.

### SECT. II. FOSSILIA.

Zincum.
Sulphas Zinci. Externe pro Lotione.
Nitras Potassæ.
Acid. nitrosum. dr. 1—2. ad Aq. lib. 1. in die.
Febres, &c.
Spirit. ætheris nitrosi E. } gtt. 30—dr. 1.
nitrici. L.
æthereus nitros. D.
Trochisci Nitrat. Potass. E.
Febres. Phlegmas. Hæmorrh. Maniam.
Murias Sodæ.
Acidum Muriaticum. gtt. 20—40 dilut. subind.
Febres.
Acidum Sulphuricum. E. L.
Vitriolicum. D.
Acidum Sulphuric. dilutum. E. L. } ut Ac. Mur.
vitriolic. dilut. D.
Febres. Hæmorrhag.
Plumbum. E. L. D.
Acetis Plumbi. E.*
Cerussa Acetata. D.
Plumbi Superacetas. L.
Interne ad Hæmorrhag. sed cautssime.
Aqua Lithargyr. acetati. L. } Externe.
Liquor Litharg. acetat. D.
Liquor Plumbi acetatis dilutus. L.
Liquor Litharg. Acetat. comp. D.
Unguent. Acetit. Plumb. E.
Cerat. Litharg. acetat. comp.
Ad Phlegmasias. &c.

* It is now found that there are two acetats of lead, an acetat which crystallizes in scales, and this salt, which containing an excess of acetic acid should be called superacetas plumbi, as it is in the new London Pharmacopœia.

## CLASS XI. ASTRINGENTIA.

### SECT I. VEGETABILIA.

Hæmatoxylum campechian. E.
Hæmatoxylum. L. D.
Americ. Lign. Decoct.

Extract. Lign. Hæmat. camp. E. Hæmatoxyl. L. D. } gr. 10—30.
Juglans regia.
Brit. Fruct. immatur. Decoct. Externe. Ulcera.
Kino. E. L. D.
Africa Pulv. Solut. gr. 15—30.
Tinct. Kino. E. D. dr. 1—2.
Diarrh. Dysent. Menorrh.
Mimosa Catechu. E.
Catechu. L. D.
India. Extract. lign. Pulv. Solut. scr. 1—2.
Infus. Mimos. Catechu. E. unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Tinct. Mimos. Catechu. E. Catechu. L. } dr. 1—3.
Elect. Catechu. E. Comp. D. } scr. 2—4.
Diarrh. Dysenter.
Anchusa. Tinctoria. E.
Anchusa. D.
Eur. Merid. Radix.
Boletus igniarius. E.
Agaricus.
Brit. ad vulnèra.
Pterocarpus Santolinum. E.
Santolinum rubrum. D.
India Lign.
Polygonum Bistorta.
Bistorta. L. D.
Brit. Rad. Pulv. dr. $\frac{1}{2}$—1. Decoct.
Potentilla reptans.
Brit. Fol.
Prunus Spinosa.
Prun. domestica. L.
Brit. Fruct. ad libit.
Pterocarpus Draco. E.
Pterocarpus. L.
Sanguis Draconis. D.
Amer. merid. Resina.
Punica granatum.
Granatum. L.
Flor. Balaust. D.
Eur. Merid. Flor. Cort. Fruct.
Decoct. ad Gargar. ad libit.
Quercus cerris. E.
Gallæ. L. D.
Asia. Cyniphis nidus. Pulv. Inf. Ungt.
Quercus robur. E.
Quercus. L. D.
Brit. Cort. Decoct. Externe.
Scarlatin. Angin.—Uvulæ relaxat.
Hæmorrh. Menorrhag.
Rosa Gallica. E. L.
Ros. Rubr. D.
Eur. Merid. Brit. Petal. Inf. Conserv. ad libit.
Inf. Ros. Gallic. E. Rosæ. L. Rosar. D. } ad libit.
Conserv. Ros. gallicæ. E.
Rosæ. D.
Confectio Ros. Gall.
Syrup. Ros. Gall. E.
Mel. Ros. L. D.
Hæmorrh. Cynanchen, &c.
Tormentilla erecta. E.
Tormentilla. L. D.
Brit. Rad. Decoct. unc. $\frac{1}{2}$—1.
Diarrhœa.

SECT. II. FOSSILIA.

Sulphas Cupri. gr. $\frac{1}{2}$—1. bis turve in die.
Febr. Intermitt.
Inject. Lot. Collyr.
Solut. Sulphat. Cupri. E.
Liquor Cupri Ammoniat. D.
Ophthalm. Gonorrhœa.
Zincum.
Sulphas Zinci. gr. 2—5. bis terve in die.
Febres Intermitt.
Solutio Acetit. Zinci. Collyr. Inject.
Ophthalm. Blenorrh.
Ferrum.
Tinctura Muriat. Ferri. gtt. 10—20. ter in die.
Menorrhag. cum debilitate.
Plumbum.
Acetis Plumbi. Lotion.
Oxydum album et Semivitreum.
Super-Sulphas Alumin. et Potass.
Sulphas Alumin. E.
Alumen. L. D.
Brit. Pulv. Solut. gr. 5—15.
Externe p. Gargar. et Lotione.
Sulphas Alumin. exsiccat. E.
Alumen exsiccatum. L.
Pulvis Sulphat. Alumin. comp. E. gr. 15—30.
Ophthalm.
Aqua Alumin. comp. L. pro Lotione.

## CLASS XII. TONICA.

SECT. I. VEGETABILIA.

Anthemis Nobilis. Pulv. gr. 10—scr. 1. Infus unc. $\frac{1}{2}$. ad lib. 1.
Centaunæ benedicta. Infus.
Marrubium Vulgare. Infus.
Myrrha. Pulv. Pil. gr. 10—20.
Pulv. Myrrh. Comp. gr. 20. ad 30.
Dorstenia Contrajerva. Pulv.
Pulv. Contrajerv. Comp. L. gr. 20—30.
Vitis Vinifera.
Vinum rubrum Lusitanum.
Æsculus Hippocastanum. E.
Asia. Brit. Cort. Pulv. dr. $\frac{1}{2}$—scr. 2.
Decoct. unc. 1. ad lib. 1.
Angustura. E. L. D.
Ind. Occident. Cort. Pulv. gr. 15—dr. $\frac{1}{2}$. Inf.
Chironea. Centaur. Gentian. Cent. E.
Centaur. Min. D.
Brit. Summitat. Infus.
Cinchona officinalis. E.
Cinchona. lancifolia: cordifolia: et oblongifolia. L.
Cort. Peruv. D.
Peru. Cort. Pulv. dr. $\frac{1}{2}$—2. Electuar. Enem. dr. 1—3.
Inf. Cinchon. Off. E. Cort. Peruv. } unc. 2—4.
Decoct Cinchon. Off. Cort. Peruv. } unc. 3—6.
Tinct. Cinchon. Off. E. L. D. unc. $\frac{1}{2}$—1.
Comp. L. D. dr. 3—6.
Ammoniat. dr. $\frac{1}{2}$—1.
Extract Cinchon. Off. E. Cort. Peruv. L. D. } gr. 10—20.
Ad Febres. Rheumatism. Odontalg. Catarrh. Febril. Blenorrh. Dysenter. Erysipelat. Scarlatin. Hæmoptys. Menorrhag. Dyspeps. Hypochond. Astheniam. Spasmos. Hydrop.
Cinchona Caribbæ.
Insul. Caribb. Cort. (ut Cinchon Off.)
Calumba. L.
Columba. E. D.
Ceylon. Africa. Rad. Pulv. gr. 5—20. Inf. dr. 3. ad lib. 1.
Tinct. Columbæ. D. E.

Calumbæ. L.
Croton. Eleutheria. E.
Cascarilla. L. D.
Ind. Or. et Occident. Cort. Pulv. scr. 1—dr. 1.
Tinct. Cascarill. L. D. dr. 2—6.
Extract. Cascarill. D. gr. 10—20.
Gentiana lutæ. E.
Gentiana. L. D.
Eur. Merid. Rad.
Inf. Gentian. Comp. E. unc. $\frac{1}{2}$—1.
D. dr. 6—12.
L. unc. 2—4.
Tinct. Gentian. Comp. E. L. dr. 2—6.
Vin. Gent. Comp. E. unc. 1—2.
Extract. Gent. L. D. lut. E. gr. 10—30.
Menyanthes Trifoliata. E.
Trifol. Paludos.
Brit. Rad. Exsiccat. Inf. unc. $\frac{1}{2}$—lib. 1.
Quassia Excelsa. E.
Quassia. L.
Insul. Caribb. Lignum. Cort. Rad. Inf. dr. $\frac{1}{2}$—2. ad lib. 1.
Qu. Simaruba. E.
Simarouba. L. D.
Ind. Occ. Cortex. Decoct. dr. 2. ad lib. 1.
Salix fragilis.
Salix. D.
Brit. Cortex. Pulv. scr. 2—4.
Decoct. unc. 2. ad lib.
Swietenia Mahagani. E.
Ind. Occ. Cortex. Pulv. Decoct. ut Cinchona.
Sw. Febrifuga. E.
Ind. Occ. Cort. ut supra.
Tanacetum. vulgare.
Tanacetum. D.
Brit. Fol. Flor. Infus.
Ad Vermes.

SECT. II. FOSSILIA.

Sulphas Cupri. gr. 1—3. bis terve in die.
Febr. Intermitt.
Ammoniaretum Cupri. E. } gr. $\frac{1}{2}$.
Cuprum Ammoniatum. L. }
bis terve in die.
Pilulæ Ammoniar. Cupri. E. Pil. 1.
Epileps.
Zincum.
Sulphas. Zinci. gr. 2—5. bis terve in die.
Febr. Intermitt. Epileps.
Solutio Sulphat. Zinc. E.
Externe pro Collyrio.
Oxydum Zinci. E.
Zinci oxydum. L. } gr. 1. bis terve in die.
Calx Zinci. D. }
Epileps.
Nitras Patassæ.
Acidum Nitrosum. gtt. 30—40.
Sulphas Magnesiæ. Solut. dr. 2. bis in die.
Ferrum.
Carbonas Ferri scr. 1—dr. 1.
Præcip. gr. 5—15.
A. Ferri ærati. D. lib. $\frac{1}{2}$. bis in die.
Sulphas Ferri. gr. 1—5.
Vinum Ferri. dr. 2—6. bis in die.
Tinct. Muriat. Ferri. gt. 10—30. bis in die.
Sulphas Ferri exsiccat. E.
Oxydum Ferri rubrum. E.
Emplast. Occid. Ferri rub. E.
Ferri limatura purific. E.
Oxydum Ferri nigr. purific. E.
Murias Ammon. et Ferri. E. } gr.
Ferrum Ammoniatum. L. } 3—10.
Tinct. Ferr. Ammoniac. L. gtt. 10—30.

Tartris Ferri et Potassæ. E. } gr.
Ferrum Tartarisatum. L. } 10—30.
Tinct. Ferri acetati. D. gtt. 20—40.
Dyspeps. Hypochondrias. Asthen. Choream.
Hydrop. Chloros. Phthis. Vermes.
Acidum Sulphuricum.
Acidum Sulphur. dilutum. gtt. 20—40.
Acidum Sulphuric. Aromaticum E. gtt. 10—20. bis terve in die.
Dyspeps, &c.
Argentum. L. E. D.
Nitras Argenti. E. L. } gr. $\frac{1}{8}$—$\frac{1}{4}$.
Argentum Nitratum. D. } bis in die.
Arsenicum. Oxyd. alb. vel. Acid. Arsen.
Oxydum Arsenici. E.
Solut.
Carbonas Barytæ. E.
Vid. Sulphas Barytæ.
Carbonas Calcis. E.
Creta. L. D.
Brit. &c.
Solutio, Muriatis Calcis. E. gt. 30—60. bis terve in die.
Ad Scrofulam, Schirrum, &c.
Sulphas Barytæ.
Terra ponderosa.
Brit.
Murias Barytæ. E.
Solutio Muriatis Barytæ. E. gt. 5—10. bis terve in die.
Ad Scrofulam, Schirrum, &c.

## CLASS XIII. STIMULANTIA.

### SECT. I. ANIMALIA.

Murias Ammoniæ.
Aqua Ammoniæ. E. gt. 10—20.
Liquor Ammoniæ. L.
Liquor alkal. volat. caust. D.
Alcohol Ammoniatum. E. gt. 20—40.
Spiritus Ammoniæ. L.
Alkal. volat. D.
Carbonas Ammoniæ, E. gr. 5—10.
Ammoniæ Carbonas. L.
Alkali volatile mite. D.
Aqua Carbonat. Ammon. E. gt. 20—dr. 1.
Liq. Ammoniæ Carbonatis. L.
Liq. alkal. volatil. mit. D.
Ammoniæ Carbonas L. gr. 10—20.
Oleum Ammoniatum, E.
Liniment. Ammon. fort. L.
Liniment. Ammon. Carbon. L.
Liniment. volatile. D.
Alcohol. Ammoniat. aromaticum. E. gt. 20—dr. 1.
Spir. Ammon. arom. L.
Alcoh. volat. arom. D.
Spir. Ammon. succin. L.
Asphyx. Spasmos. Rheumatism, &c.
Moschus moschiferus.
Bol. Mist. gr. 10—scr. 1.
Mistura Moschata. unc. 1—2.
Ad Typhum. Gangraen.
Coccus Cacti. E.
Coccus. L.
Mexico.
Lytta vesicatoria.
Bol. gr. 1—3.
Tinct. Meloes vesicat. gt. 10—30.
Ungt. Infus. mel. vesicat. E.
Lyssæ. L.
Cantharid. D.
Pulv. mel. vesicat. E.

Ceratum. Lyttæ. L.
Empl. melo. vesicat. E.
Lyttæ. L.
Cantharidis. D.
mel. vesicat. com. E.
Ad Synoch. Typh. Phrenit. Cynanch. Pneumon. Gastrit. Enterit. Rheumatism. Odontalg. Variol. Scarlatin. Apoplex. Paralys. Choream. Asthm. Dyspnœam. Pertuss. Colicam. Hysteriam. Hydrophob. Maniam, Icterum. Caligin. Amauros. Ischuriam.

SECT. II. VEGETABILIA.

Sinapis alba.
Semen et ejusd. Pulvis. dr. 1—4.
Cataplasma Sinapeos. D.
Sinapis. L.
Rheumatism. Paralys.
Allium sativum.
Rad. recens.
Arum maculatum.
Rad. recens. Bol. Elect. Emuls. gr. 10—20. bis in die.
Rheumatism.
Pimpinella Anisum.
Semen.
Ol. volat. Pimpin. Anisi. gtt. 2—6.
Dyspeps. &c.
Styrax Benzoin.
Balsamum.
Acidum Benzoicum. gr. 1—3.
Tinctura. Benzoini comp. L. gtt. 10—20.
Alcohol.
Æther Sulphuricus. L. dr. ½—dr. 1.
Ad. Morb. spasmod.
Æther Sulphuric. cum Alcohole. E.
Liquor ætherus. vitriolicus. D. gtt. 15—30.
Æther Sulphur. cum Alcohol. comp. E. gtt. 15—30.
Acidum Acetosum.
Acidum Acetosum forte. E.
Externe per nares in Syncope, Asphyxia, &c.
Acidum Acetosum Camphoratum. E.
Ut supra.
Acetum Aromaticum. E.
Ut supra.
Aristolochia Serpentaria.
Rad. Pulv. Bol. scr. 1—2.
Tinctura Aristol. Serpentar. dr. 2—6.
Typh. Dyspeps.
Daphne Mezereum.
Rad.
Decoctum Daphn. Mezerei. unc. 1—2. sæp. in die.
Ad morbos cutan. Syphil.
Guaiacum officinale.
Lign. Decoct. unct. 1. ad lib. 1. Resin Pulv. Emuls. gr. 10—20.
Rheumatism. Syphil. Morb. cutan.
Decoctum Guaiac. officin. unc. 4—8. bis in die.
Tinctura Guaiac. offic. dr. 2—4.
ammoniat. dr. 1—3.
Papaver somniferum.
Opium. gr. ¼—1. dos. repetit.
Tinctura Opii gtt. 5—20. simili modo.
Camphorat. dr. 1—4.
Ammoniat. dr. ½—1.
Typh. Dyspeps. Tetan. &c.
Cochlearia Armoracia.
Rad. rec. Subst. Infus.
Spirit Armoraciæ comp. L. unc. 1—2.

Paralys. &c.
Copaifera officinalis.
Balsam. gtt. 15—30.
Pinus { Sylvestris. Larix.
Ol. vol. Pini puriss.
Ungt. Resin. flav. D.
Resinosum. E.
Cerat. Resin. L.
Empl. Ceræ. D. comp. L.
Ungt. Picis. L. D.
Empl. Picis. Burgund.
Externe ad Ulcera. &c.
Arnica montana.
Rad. Pulv. scr. 1—2.
Typh. Paralys.
Bubon Galbanum.
Pilul. Galbani comp. gr. 15—20.
Emplastrum Galbani comp. E.
Lithargyri compos. L.
Juniperus Sabina.
Oleum Juniper. Sabinæ. gt. 1—4.
Pastinaca Opoponax.
Pil. gr. 2—5.
Veratrum album.
Unguentum Hellebori albi. L.
Decoct. Veratri. L.
Amomum Zingiber.
Rad. Pulv. gr. 5—20.
Podagr. retroced. vel atonic. Paralys. Dyspeps, &c.
Syrupus Amom. Zingib.
Tinctura Amom. Zingib. E. dr. 2—4.
Acorus Calamus. E.
Calamus. L.
Brit. Rad. Pulv.
Amomum repens. E.
Cardamomum. L.
Cardamomum minus. D.
India. Semen.
Tinctura Amomi repent. E. } dr. 2—4.
Cardamomi. L. D. }
comp. L. dr. 2—4.
Amyris Gileadensis.
Asia. Resina.
Amyris Elemifera.
Elemi. L. D.
Amer. mer Resina.
Unguentum Elemi. comp. L.
Anethum Fœniculum. E.
Anethum. L.
Fœniculum. D.
Brit. Sem. Decoct. Enem.
Oleum volatil. Fœnicul. dulc. D.
Aqua. L. unc. 1—3.
Anethum graveolens.
Eur. mer. Semen.
Aqua Anethi. L.
Angelica Archangelica. E.
Angelica. D.
Cult. Rad. Semen.
Apium Petroselinum. E.
Cult. Rad. Semen.
Arbutus Uva Ursi. E.
Uva Ursi. L. D.
Eur. merid. Folia. Pulv. scr. 1—dr. 1. Infus.
Ad Calculum.
Artemisia maritima.
Absinthium. L.
Brit. Cacumen.
Canella alba. E. D.
Canella.
India Occid. Cortex. Pulv.
Carbo Ligni.

Delphinium Staphisagria.
Staphisagria. L. D.
Eur. Mar. Sem. Pulv.
Capsicum annuum.
Piper Indicum. D.
Ind. Occ. Capsulæ. Pulv. gr. 2—6. Infus.
Ad Febres. Scarlatinam anginosam.
Carum Carvi. E.
Carum. L.
Carui. D.
Cult. Semen. Decoct.
Oleum Carui. L. gtt. 1—4.
Spiritus Cari Carvi. E. } unc. ½—2.
Carui. L. D.
Dyspeps. Colic.
Cistus Creticus.
Syria. Resina.
Citrus Aurantium.
Aurantium. L.
Aurantium Hispalense. D.
Eur. merid. Flores. Cortex. Fruct. Infus.
Oleum volat. Citri Aurant. E. gtt. 2—6.
Aqua Citri Aurantii. E. unc. 1—3.
Tinctura Aurantii L. D. unc. ½—1½.
Syrupus Citri Aurantii. E.
Cort. Aurantii. D.
Confectio Aurantii. L.
Conserva Citri Aurantii. E.
Cort. Aurantii. D.
Coriandrum sativum. E.
Coriandrum. L. D.
Eur. merid. Semen. Pulv. Infus.
Crocus sativus. E.
Crocus. L. D.
Cult. Stigmata. Infus.
Syrupus Croci. L.
Tinctura Croci. E. dr. 2—4.
Cuminum Cyminum.
Cuminum. L.
Ægypt. Sicil. Semen. Decoct.
Emplastrum Cumini. L.
Curcuma longa.
India. Radix. Pulv.
Daucus Carota. E.
Daucus. L.
Brit. Semen. Radix. Cataplasm.
Dianthus Caryophyllus. E.
Caryophyllum rubrum. D.
Italia. Petala. Infus.
Eugenia caryophyllata. E.
Caryophyllum aromaticum. D.
Caryophyllum. L.
Insul. Molucc. Floris germen.
Oleum volat. Caryophylli aromatici. gtt. 1—2.
Odontalg. Colic.
Hypericum perforatum.
Brit. Flos.
Inula Helenium.
Enula campana. D.
Brit. Radix.
Juniperus Lycia. E.
Olibanum.
Asia. Gum-resin. Pilul.
Kaempferia rotunda. E.
India. Rad. Pulv.
Lavandula Spica. E.
Lavandula. D. L.
Cult. Flores.
Oleum volat. Lavandulæ Spicæ. E.
Lavandulæ. L.
Spiritus Lavandulæ Spicæ. E.
Lavandulæ. L.
Spiritus Lavandulæ comp. E. L. dr. ½—1.
Laurus Cinnamomum. E.
Cinnamomum. L. D.
Ceylon. Cortex. Pulv. gr. 5—15. Infus.
Ol. essent. Cinnamom. D. gt. 1—2.
Aqua Laur. Cinnam. E. unc. 1—3.
Cinnamom. L. D.
Spir. Laur. Cinnamom. E. unc. ½—1½.
Cinnamom. L. D.
Tinct. Laur. Cinnamom. E. dr. 2—4.
Cinnamom. L. D.
Cinnamom. comp. E. dr. 1—2.
Cinnam. comp. L. D.
Pulv. Aromaticus. E. D. } gr. 10—20.
Cinnam. comp.
Electuar. Aromat. E. D. gr. 10—30.
Confect. Aromat. L.
Laurus Cassia. E.
Cassia lignea. D.
India. Cortex. Pulv. &c. Flor. nondum. explicit.
Aqua Lauri Cassiæ. E. unc. 2—4.
Laurus nobilis. E.
Laurus. L. D.
Cult. Folia. Bacc. et Oleum Bacc. Externe.
Lobelia syphilitica. E.
Virgin. Rad. Pulv.
Ad Siphilidem.
Melaleuca Leucodendron. E.
Cajeputa.
Insul. Molucc. Ol. essential. gtt. 1—4. et Externe.
Rheumatism.
Mentha viridis. E. L.
Mentha sativa. D.
Cult. Herba. Infus.
Oleum Menthæ viridis. L. gtt. 2—6.
Aqua Menthæ sativæ. D. unc. 2—6.
viridis.
Spiritus Menthæ sativæ. L. unc. 1—2.
Colic.
Mentha Piperita. E. L.
M. Piperitis. D.
Cult. Herba. Inf.
Aq. Menthæ piperitæ. E. L. unc. 1—4.
piperitidis. D.
Ol. volat. Menthæ piper. E. gt. 1—3.
Menth. piper. L.
essent. M. piperitid. D.
Spir. Menthæ piperit. E. dr. 2—6.
piperitid. L. D.
Mentha Pulegium. E.
Pulegium. L. D.
Cult. Herba Infus.
Aq. Menth. Pulegii. E. unc. 2—4.
Pulegii. L. D.
Ol. volat. Menth. Puleg. E. gt. 1—3.
essent. Pulegii. L. D.
Spirit. Pulegii. L. unc. 1—2.
Myristica Moschata. E.
Myristica. L.
Nux Moschata. D.
Insul. Molucc. Nucleus. Pulv. Ol. volatil. et express. gtt. 1—3.
Spiritus Myristic. Moschat. E. } dr. 2—6.
Nucis moschatæ. D.
Myristicæ.
Myroxylon Peruiterum. E.
Balsamum Peruvianum. L. D.
Amer. merid. Balsam. gtt. 10—30.
Tinctura Balsami Peruviani. dr. 1—2.
Myrtus Pimenta. E.
Pimenta. L.
Pimento. D.
Jamaica. Bacca.
Aq. Myrti Piment. E. unc. 2—6.
Piment. L.
Ol. volat. Myrt. Pim. E. gt. 1—3.

Spir. Myrt. Piment. E. unc. 1—2.
Piment. L. D.
Origanum vulgare. E.
Origanum. L. D.
Brit. Herba.
Oleum Origani. L.
Ad Odontalg.
Panax quinquefolium.
China. Radix. Pulv.
Parietaria officinalis.
Brit. herba.
Pinus balsamea. E.
Balsamum Canadense.
Americ. septent. Resina liquida.
Piper nigrum. E. L. D.
India Fruct.
Piper Cubeba.
Java Fruct.
Pip. longum. E. L. D.
Fruct.
Pistacia Terebinthus.
Terebinthina Chia. L.
Insul. Chio. et Cyprus.
Rhus Toxicodendron. E.
Amer. Folia Pulv. gr. ½.—bis terve in die.
In Paralysin.
Styrax officinale. E.
Styrax. L. D.
Eur. merid. Balsam.
Styrax purificata. L. D.
Toluifera Balsamum. E.
Balsamum Tolutanum. L. D.
Amer. merid. Balsam. Troch.
Tinctura Toluiferæ Balsam. E.
Syrupus Toluiferæ Balsam. E.
Tolutan. L.
Trigonella Fœnum græcum.
Gallia. Semen. Catapl. Fotus.
Urtica dioica.
Urtica. L.
Brit. Herb. rec. Externe. Pulv. scr. 1—dr. 1.
Paralys. Febr. Intermitt.
Wintera aromatica. E.
Amer. merid. Cortex. Pulv.

SECT. III. FOSSILIA.

Hydrargyrum.
Vid. Sialagoga.
Ungt. Oxid. Hydr. rubr. E.
Nitrat. Hydrarg. E.
Hydrarg. nitrat. L.
Un. nitrat. Hydrarg. mitius. E.
Nitras Potassæ.
Acidum nitrosum. dr. 1—in die.
Unguentum Acidi nitrosi. E.
Ad morb. cutan.
Sapo Hispanus.
Tinctura Saponis. E.
Linimentum Saponis compos. L.
Saponaceum. D.
Rheumatism, &c.
Tinctura Saponis cum Opio. E.
Ceratum Saponis. L. D.
Emplastrum Saponis. L.
Saponaceum. E. D.
Murias Sodæ.
Murias Sodæ exsiccatus. E.
Externe in Asphyx.
Acidum Sulphuricum.
Externe in Ungt. ad morb. cutan. et interne.
Oxidum Arsenici.
Externe in Carcinom.
Bitumen Petroleum. E.
Petroleum. L.
India.
Oleum Petrolei.
Sub-boras Sodæ.
Boras Sodæ. E.
Borax. D.
India Pulv. Linctus.
Ad Aphthas.
Sub-acetis Cupri. E.
Ærugo. L. D.
Collyr. Ungt.
Unguentum Sub. acetit. Cupri. E.
Calx. E. L.
Calx viva. D.
Linimentum Aquæ Calcis. E.
Ad Tineam Capitis.
Nitras argenti.
Externe pro escharchio.

CLASS XIV. ANTISPASMODICA.

SECT. I. ANIMALIA.

Murias Ammoniæ.
Vid. Stimulantia.
Moschus moschiferus.
Pulv. Bol. scr. 1—dr. ½.
Cervus Elaphus.
Cornu Cervin. rectificat. D. gtt. 15—30.
Castor Fiber. Pulv.
Tinctur. Castor. gtt. 30—dr. 1.
compos. gtt. 20—40.
Ad Hysteriam, &c.

SECT. II. VEGETABILIA.

Cephælis Ipecacuanha.
Pulv. gr. 3—6.
Nicotiana Tabacum.
Fum.
Colic.
Ferula Asa fœtida.
Pilul. gr. 10—scr. 1.
Alcohol Ammoniat. fœtid. E. } gtt. 15—30.
Spiritus Ammoniæ fœtid. L. } gtt. 15—30.
Spt. Alkali. volatil. fœtid. D. } gtt. 15—30.
Pilulæ Asæ fœtid. comp. E.
Emplastr. Asæ fœtid. E.
Hysteria, &c.
Alcohol.
Æther Sulphuricus. dr. ½—2.
Laurus Camphora.
Emulsio Camphorata, unc. 2—3.
Mistura Camphorata, unc. 2—3.
Tinctura Camphoræ. E.
Spirit. Camphoratus. D. Externe.
Camphoræ. L.
Liniment. Camphor. com. L.
Camphorat. D.
Papaver somniferum.
Opium. Pil. Mist. gr. 1—
Liniment. Enem.
Tinct. Opii.
camphoræ. comp. L. dr. 1—4.
ammoniata, E. dr. 1.
Elect. Opiatum. gr. 5.
Pilul. Saponis cum opio. L.
Opiatæ. gr. 10.
Bubon Galbanum.
Pilul.
Pilul. Galbani comp. L. gr. 15—40.
Hysteria.
Vitis vinifera.
Vinum rubrum Lusitanum. lb. 1—in die.
Ad Tetanum.
Citrus Aurantium.
Fol. Pulv. dr. ½.
Convuls.

Artemisia Absinthium.
Absinthium. L.
Brit. Cacumen. Oleum. volat.
Carbonas Potassæ impurus. E.
Cineres clavellati. D.
Aqua potassæ. E.
Liquor potassæ. L.
Lixivium alkali vegetab. caust. D.
Externe in Balneo ad Tetanum.
Cardamine pratensis. E.
Cardamine. L.
Brit. Flores. Pulv. dr. ½. bis in die.
Ad Choream, &c.
Conium maculatum. E.
Conium. L.
Cicuta. D.
Brit. Folia. Pulv. gr. 1.
Succus spissat. Conii maculat. E.
Extract. Cicutæ. D.
Conii. L.
Fuligo Ligni Combusti. D.
Hyster.
Hyoscyamus niger. E.
Hyoscyamus. D.
Brit. Folia. Semen.
Succus spissat. Hyoscyam. nigri. E. gr. 2—4.
Valeriana officinalis. E.
Valeriana. L. D.
Brit. Radix. pulv. scr. 1—dr. 1—bis terve in die.
Tinctura Valerianæ. L. dr. 2—4.
Ammoniat. E. dr. 1.
Extract. Valerian. sylvestr. resinos. D.
Ad Hysteriam, &c.

SECT. III. FOSSILIA.

Hydrargyrum.
Vid. Sialagoga.
Bitumen Petroleum. E.
Petroleum. L. D.
Italia.
Oleum Petrolei. L.
Succinum. L. E. D.
Oleum Succini. E. L.
purissimum. E. } gtt. 10—20.
rectificat. D. }
Sal Succini. D.
Spiritus Ammoniæ. succinat. L. gtt. 30.

## CLASS XV. NARCOTICA.

VEGETABILIA.

Nicotiana Tabacum.
Vinum Nicot. Tabaci. E. gt. 30.
dr. 1 bis in die.
Aconitum neomontanum.
Succus spissat. Aconit. napel gr. ½—2.
Papaver somniferum.
Tinct. Opii. gt. 25.
Camphorat. dr. 2—6.
Syrup. Opii. D.
Extr. Papaver. somnifer. E.
Pulv. Opiat. E. gr. 10.
Elect. Opiatum. E. gr. 43.
Confect Opii. L. gr. 36.
Pil. Opii. E. gr. 5.
Opiatæ. E. gr. 10.
Ad Febr. intermittent. Typh. Rheumatism. Odontalg. Catarrh. Dysenter. Ophthalm. Enterit. Scarlatin. Variol. Rubeol. Hæmoptys. Menorrhag. Hæmorrh. Tetan. Choream. Epileps. Pertuss. Asthmat. Hydrophob. Angin. pectoris. Hysteriam. Phthis. Icter. Diabet.
Rhododendron Chrysanthum.
Folia. Vid. Diaphoretica.
Digitalis purpurea.
Pulv. gr. 1.
Tinctura Digital. purpur. gtt. 10—
Ad Synocham. Phrenit. idiopath et Hydrocephalic. Pneumon. Phthisin, &c.
Arnica montana.
Flores. Pulv. gr. 5.
Paralys. Convuls. Amauros.
Rhus Toxicodendron.
Folea. Vid. Stimulantia.
Conium maculatum.
Pil. Pulv. gr. 1.
Succus spissat. Conii maculat. gr. 2.
Hyoscyamus niger.
Succus spissat. Hyoscyam. nigr. gr. 2—4.
Tinctura Hyoscyami nigr. E. dr. 1.
Atropa Belladonna. L. D.
Belladonna. L. D.
Brit. Fol. Pulv. gr. 1.
Datura Stramonium. E.
Brit. Fol. Pulv. gr. ½.
Humulus Lupulus.
Humulus. L.
Extractum gr. v—20.
Tinct. dr. ½—1.
Lactuca viroso. E.
Brit. Folia. Succ. spissat. gr. 1.
Ad Hydrop.
Papaver Rhœas. E.
Rhœas. L.
Brit. Petala. Infus.
Syrupus Rhœados. L.
Sium nodiflorum.
Brit. Herba.

## CLASS XVI. ANTHELMINTICA.

SECT. I. ANIMALIA.

Murias Ammoniæ.
Aqua Carbonatis Ammoniæ.
Emuls.

SECT. II. VEGETABILIA.

Anthemis nobilis.
Pulv. scr. 1.—dr. ½—bis in die.
Lumbric.
Nicotiana Tabacum.
Enema.
Ascarid.
Olea Europea.
Oleum. Enema. Emuls.
Allium sativum.
Rad. recens. Subst. ad libitum.
Ferula Asa fœtida.
Gum. Resin. Enema. scr. 1—2.
Convolvulus Jalapa.
Rad. Pulv. gr. 10—30.
Convolvulus Scammonium.
Pulv.
Pulvis Scammonii compositus.
Helleborus fœtidus.
Fol. Succ. express.
Lumbric.
Rheum palmatum.
Pulv. gr. 5—10. omni nocte.
Ricinus communis.
Oleum express. unc. ½—1. Enem. unc. 1—2.
Stalagmitis Cambogioides.

Pil. gr. 5—15.
Ad Tæniam.
Ruta graveolens.
Infus. Enema.
Oleum volat. Rutæ. gtt. 3—6.
Juglans regia.
Cortex Fructus immatur. Extract.
Tanacetum vulgare.
Flor. Pulv. scr. 1—2.
Valeriana officinalis.
Rad. Pulv. dr. 1.
Artemisia Santonica. E.
Santonicum. D.
Asia. Semen. Pulv. dr. $\frac{1}{2}$.—scr. 2. bis in die.
Dolichos pruriens. E.
Ind. Occ. Pubes leguminum. Elect. gr. 10—30.
Geoffrœa inermis. E.
Jamaica. Cortex. Decoct. Syrup.
Decoctum Geoffr. inerm. E. unc. 1—2. omni mane.
Polypodium Filix mas. E.
Filix. L.
Filix mas. D.
Brit. Rad. Pulv. dr. 2—3.
Ad Tæniam.
Spigelia marilandica. E.
Amer. Rad. Pulv. gr. 10—scr. 2.

SECT III. FOSSILIA.

Hydrargyrum.
Amalgama Stanni.
Submurias Hydrargyri. gr. 3—10.
Murias Sodæ.
Pulv. dr. $\frac{1}{2}$—unc. 1.
Ferrum.
Carbonas Ferri gr. 10—30.
Sulphas Ferri gr. 3—10.
Ferri limatura purificat. dr. $\frac{1}{2}$—1.
Tartris Ferri et Potassæ. gr 10—scr. 1.
Calx. E. L.
Calx recens usta. D.
Aqua Calcis. L. E. D. Enema. lib. $\frac{1}{2}$—1.
Ad Ascard.
Stannum. L. E. D.
Stanni Pulvis. unc. $\frac{1}{2}$—1.
Ad Tæniam, et Lumbric.

## CLASS XVII. ABSORBENTIA.

SECT. I. ANIMALIA.

Cervus Elaphus.
Phosphas Calcis. E. } gr. 10—20. bis in die.
Cornu ustum. L. }
Ad Rachit.
Cancer Astagus et Pagurus. E.
Murias Ammoniæ.
Aq. Ammoniæ. gtt. 10—15.
Carbonas Ammoniæ. gr. 5—15.
Aq. Carbonatis Ammon. gtt. 20—40.
Sal. Cornu Cervi. gr. 5—12.
Ad Cardialg, &c.
Isis nobilis. E.
Ostrea edulis. E.
Brit. Testæ Pulv.
Testæ prepar. L.
Spongia officinalis. E.
Spongia. L.
Spongia usta. L. scr. 1—2.
Ad Scroful.

SECT. II. VEGETABILIA.

Carbonas Potassæ impurus.
Aqua Potassæ.
Potassa. E. Externe.
Potassa fusa. L.
Alkali vegetabile caust. D.
Potassa cum Calce. E. L.
Causticum mitius. D.
Carbonas Potassæ. E. gr. 10.
Potassæ Subcarbonas. L.
Alkali vegetabile mite.
Carbonas Potass. puriss. E. gr. 10.
Aqua Potass. Carbonat. L. gt. 30.
Lixivium mite. D.
Aqua super-carbonat. Potass. E. unc. 4. sæp. in die.
Liquor Alkal. veget. mitiss. D.
Ad Cardialg. Calculum, &c.

SECT. III. FOSSILIA.

Sulphur sublimatum.
Sulphuretum Potassæ. E. L. } gr. 10.
Alkali vegetabile sulphurat. D. }
Ad Venena metallica.
Hydrosulphuretum Ammoniæ. E. gtt. 5—10.
Ad Diabeten.
Sulphas Magnesiæ.
Magnesiæ Carbonas. L. dr. $\frac{1}{2}$.
Magnesia Alba. D.
Magnesia. E. scr. 1—dr. 1.
Magnesia Usta. D.
Magnesia. L.
Ad Cardialgiam.
Calx.
Aqua Calcis. E. L. D.
Ad Dyspeps.
Ad Diarrhœam, &c.
Carbonas Calcis. E.
Creta. L. D.
Carbonas Calcis præparat. E. gr. 15—dr. 1.
Creta præparata. L. D.
Pulv. Carbonat. Calc. com. E. gr. 15—30.
Cretæ composit. L.
Trochisc. Carbonat. Cretæ. E. ad libit.
Potio Carbonat. Calcis. unc. 2—3.
Mistura Cretæ. L.
Aqua Æris fixi. D. lib. $\frac{1}{2}$—1 in die.
Ad Cardialgiam. Calculum.
Carbonas Sodæ impurus. E.
Soda impura. L.
Alkali fossile mite. D.
Carbonas Sodæ. E. } gr. 10—30.
Sodæ Subcarbonas. L. }
Aqua super-carbonatis Sodæ. E. lib. $\frac{1}{2}$—1. in die.
Ad Calculum, &c.
Carbonas Zinci impurus. E.
Calamina. L. D.
Brit. Ung. et Collyr.
Oxydum Zinci impurum. E.
Brit. Ung. et Collyr.

To render this article the more complete, we shall add a few remarks upon the nature, use, and indications of the respective classes in the preceding system, as they may be inserted with more propriety here than in any other part of this work.

### I. *Of Emetics.*

These may be regarded as irritative, or evacuant, or both. Of the first we have instances in the sul-

phuret of antimony, the tartar emetic of popular language, sulphat of zinc, or white vitriol, and the sulphat of copper, or blue vitriol. Of the second we have instances in ipecacuanha and squills; of the third in tobacco and foxglove.

From the use of emetic medicines the following direct effects are produced.—They excite sickness, nausea, and their common attendants. They produce the action of vomiting itself. They occasion sudden and opposite changes in the circulation.

They increase the secretion or the discharge of secreted matter from the various glands which prepare fluids to be deposited in the alimentary canal.

The changes induced in the system in consequence of the primary effects of emetics are:—The evacuation of the contents of the stomach, and, in some degree, of the upper part of the intestinal tube: free circulation through the stomach, intestines, and glands, whose secreted matters are acted upon: general agitation of the body: a commotion of the nervous system: a particular affection of the surface of the body.

The indications which emetic medicines are capable of fulfilling may be derived from the following sources: their producing agitation of the body, whence they may be employed to restore uniform circulation. To promote diminished lymphatic absorption. To remove obstructions in the sanguiferous system. From their producing evacuation by vomiting: whence they may be used to discharge noxious matters taken in by the mouth. To discharge morbid accumulations of secreted matters lodged in the stomach. To evacuate serous accumulations from the affection of the nervous system which they occasion: whence they may be employed to restore excitement to the nervous system in general, and obviate inordinate affections of the nervous energy. These illustrations may be illustrated and confirmed by attention to the use of emetics when employed in cases of fever, dysentery, pulmonary consumption, jaundice, apoplexy, dropsy, and poisons.

In the use of emetics, we ought to pay attention to the circumstances of infancy, old age, pregnancy, delicacy of habit, and plethora. The circumstances chiefly to be regarded with respect to the regimen necessary for this class are, the state of the stomach when the emetic is exhibited; the means of facilitating the operation; the time of exhibiting the medicine; the temperature in which the patient is kept, after its operation is finished. The different individuals belonging to the class of emetics are chiefly contra-indicated by the presence of the following morbid states: A rupture or relaxation of containing membranes. Topical inflammation of the internal viscera. A high degree of morbid debility in these. Fixed obstructions to the circulation.

## II. *Of Expectorants.*

The direct effects of the medicines which are employed under this name are as follows. They stimulate the lungs themselves. They augment the secretion taking place by the mucous glands of the lungs. They increase the excretion of mucus from the lungs. The changes induced in the system, from the primary effects of expectorants, are: an alteration on the state of the mucus excreted to a more thin and fluid consistence: an increase of the sensibility of the lungs: free circulation through the blood-vessels of the secreting glands: and the evacuation of those cavities in the lungs in which mucus is deposited.

Expectorants may be divided into the nauseating, as squills, gum ammoniac, and garlic; the antispasmodic, as blisters, feet, and vapour-baths; and irritative, as acid vapours, and the common smoking of tobacco. The indications these medicines are capable of fulfilling may be traced as follows: 1. From their affecting the secretion of mucus: whence they may be used to promote the secretion of mucus by the lungs, when morbidly diminished there. To render the mucus of the lungs thinner, when morbidly thick and viscid. 2. From their affecting the excretion of mucus: whence they may be employed to evacuate morbid accumulations of mucus in the lungs. To supply irritation to the lungs when morbidly deficient. 3. From their affecting the state of the lungs themselves: whence they may be employed as local stimulants.

The cautions to be observed in the employment of expectorants, as derived from their nature, chiefly respect: their operations as exciting nausea: their power of stimulating the system in general from acting on the stomach: and their influence as irritating the lungs themselves. The conditions of the system which chiefly require attention in their employment are: the degree of irritability with which the lungs are endowed: and the youth of the patient. The circumstances chiefly to be attended to in the regimen necessary for this class, are: the state of the stomach: the employment of diet fitted to conspire with the effect of the medicine: the free use of exercise: and the state of the atmosphere in which the patient breathes.

The different individuals belonging to the class of expectorants are chiefly contra-indicated by the presence of the following morbid states: a high degree of increased sensibility in the lungs: and an uncommonly quick excretion of mucus from the lungs.

## III. *Of Diaphoretics.*

These are medicines which, taken internally, increase the discharge by the skin, without exciting this effect in consequence of violent agitation or acute pain. The following are their direct results: they accelerate the motion of the blood: produce free circulation through the vessels on the surface: and excite a discharge of sweat. The changes induced in the system, from the more immediate effects of diaphoretics, are: a change in the balance of the circulation: a diminution of the quantity of circulating fluids: and a diminution more particularly of the serosity.

Diaphoretics may be regarded as pungent, of which we have instances in spirit of hartshorn, oil of lavender, or amber; stimulant, as various preparations of antimony and quicksilver, guiacum, contrayerva, and snake-root; antispasmodic, as musk, opium, and camphor; and diluent, as water, and whey. Their use and indication may be collected, 1. From their changing the mode of circulation: whence they may be employed to obviate morbid determination taking place to the internal viscera. To remove various causes obstructing or impeding the natural state of circulation on the surface. To restore the natural discharge from the body, which should take place by the surface, in those cases where it is morbidly diminished. 2. From their producing evacuation: whence they may be employed to diminish the quantity of circulating fluids, where it is greater than the state of the system at the time can admit of. To restore diminished lymphatic absorption; and to discharge

morbid accumulations of serum. These indications may be illustrated and confirmed, from practical observations concerning the effects of diaphoretic medicines in fever, dysentery, rheumatism, dropsy, and herpes.

The cautions to be observed in the employment of diaphoretic medicines, as derived from their nature, chiefly respect: the determination they produce to the surface: the acceleration of the motion of the blood, which many of them occasion: the debility which, in consequence of the discharge, is produced in the system: and the effects sometimes produced on the vessels of the surface themselves, by the free passage of the blood through them. The conditions of the system which chiefly require attention in their employment, are: the period of infancy: lax and debilitated habits: constitutions liable to costiveness.

### IV. *Of Diuretics.*

These are medicines which, from being taken internally, augment the flow of urine from the kidneys, by stimulating its secretion from the mass of circulating fluids. The changes induced in the system from these direct effects are: a change in the balance of circulation: a diminution of the quantity of circulating fluids; but more especially of the serosity and of the saline parts of the blood: an increase of absorption by the lymphatic vessels: a diminution of the quantity of matter discharged by perspiration: and an uncommon flow of fluid through the urinary passages.

Diuretics may be divided into such as are stimulant, of which we have instances in squills, broom, colchicum, cantharides: refrigerant, as sorrel, berberry, vinegar, cream of tartar; and diluent, as water, whey, and acidulated waters. Their use and indication may be ascertained from the following effects: 1. Their producing evacuation: whence they may be employed to remove superabundant serosity from the blood: to evacuate morbid accumulations of serum: to remove morbid acrimony from the blood: to diminish the quantity of circulating fluids, when too great for the state of the system at the time. 2. From their altering the mode of circulation: whence they may be employed to restore the natural secretion of urine when morbidly diminished: to diminish other secretions when morbidly augmented. 3. From their augmenting the flow of liquid through the urinary passages: whence they may be employed to remove obstructions in these passages, and to wash out acrimony from them. These indications may be illustrated by an attention to the effects of this class of medicines, as employed in ascites, icterus, and nephritis.

### V. *Of Cathartics.*

These are medicines which, taken internally, increase the number of stools by stimulating the alimentary canal, increasing the peristaltic motion of the intestines, and promoting the secretion of the fluids, which constitute alvine evacuations. They may be subdivided into the following tribes: stimulant, as jalap, aloes, bitter-apple; refrigerant, as Glauber's salts, sal polychrest, cream of tartar: astringent, as rhubarb, rose-leaves; and emollient, as manna, mallows, castor-oil.

The changes induced in the system from the primary effects of cathartics, are: the evacuation of the contents of the intestines: a diminution of the quantity of circulating fluids, and, in a particular manner, of the serosity: a change in the balance of circulation: a diminution of perspiration: higher excitement of the nervous energy in the system in general, but more especially in the intestinal canal.

The indications which cathartic medicines are capable of fulfilling may be derived from the three following sources: 1. From their producing evacuation: whence they may be employed to obviate morbid retention of the contents of the intestines. To diminish the quantity of circulating fluids when too great for the then state of the system. To evacuate morbid accumulations of serum. 2. From their altering the balance of circulation: whence they may be employed to promote free circulation through the intestines, in those cases where it is morbidly impeded: to diminish the impetus of the blood against parts morbidly affected. 3. From the affection of the nervous system which they occasion: whence they may be employed to remove torpor in the muscular fibres of the intestines. To restrain inordinate motions in these muscular fibres. These indications may be illustrated and confirmed, from considering the effects of this class of medicines as employed in dysentery, small-pox, dropsy, obstructed menstruation, and diarrhœa.

The cautions to be observed in the employment of cathartics, as derived from their nature, chiefly respect, the degree of evacuation they produce from the circulating fluids; and the topical irritation they occasion to the intestines themselves. The conditions of the system which chiefly require attention in their employment, are childhood; female habits; hysterical constitutions; high degrees both of irritability and torpor; remarkable delicacy of the stomach; and peculiar antipathies. The circumstances chiefly to be regarded with respect to the regimen necessary for this class, are: the mode of exhibiting the cathartic: the time at which it is given: the temperature in which the patient is kept during its operation: the diet employed: and the degree of exercise he uses.

The morbid conditions, contra-indicating the use of cathartic medicines, apply only to particular orders. The stimulant, refrigerant, and astringent, are contra-indicated by general inanition of the system; the stimulant, by a high degree of irritability in the intestines, and by morbidly accelerated circulation; the refrigerant, by a circulation unusually slow and languid; the astringent, by habitual costiveness; and the emollient, by uncommon relaxation of the bowels.

### VI. *Of Emmenagogues.*

By emmenagogues are meant medicines which possess a power of promoting that periodical secretion from the uterus, which should take place in certain conditions of the female frame. The following, therefore, are their effects: They stimulate the whole circulating system. They stimulate, in a particular manner, the vessels in the neighbourhood of the uterus; and this effect seems, in some degree, to be communicated to the vessels of the uterus themselves. They occasion a particular affection of the whole nervous system. The changes induced in the system from the primary effects of emmenagogues, are: an increase in the impetus of the blood circulating through the uterus and its neighbourhood: and an augmentation of the quantity of blood determined to the uterus. From some individuals referred to this class, there arises an increase of the tonic powers of the vessels in the uterus, and from others a diminution of it.

Emmenagogues may be divided into the following tribes: stimulant, as various forms of quicksilver and antimony: irritant, as aloes, savin, cantharides; tonic, as iron, cold-bath, corporeal exercise: and antispasmodic, as assafetida, castor, warm foot-bath.

Their indications may be thus traced: 1. From their changing the mode of circulation: whence they may be employed to free the circulatory system in the neighbourhood of the uterus when obstructed there: to promote that accumulation of fluid in the vessels of the uterus themselves, which is necessary to the menstrual discharge. To remove morbid obstructions to the passage of blood into the cavity of the uterus. 2. From their acting on the state of the animated solids: whence they may be used to increase the tonic power of the system where it is morbidly diminished. To increase the tonic power in the vessels of the uterus in particular, when deficient there. To remove spasmodic stricture taking place on the vessels of the uterus.

Practical observation in different cases of obstructed menstruation, arising from different causes, will illustrate and confirm these various indications.

The cautions to be observed in the employment of emmenagogues chiefly respect the consequences of a cure, if urged too precipitately or violently: the irritation produced to the intestines; and the stimulus affecting the whole system. The conditions of the animal frame which require attention in their employment, are: the age of the patient: the complaints to which she has formerly been liable: the duration of her present complaints: and her general character. The circumstances chiefly to be attended to in the regimen necessary, respect: the temperature in which the patient is kept: the use of moderate exercise: and the employment of liberal diet.

In enumerating the morbid conditions contra-indicating emmenagogues, a distinction is to be made betwixt those which contra-indicate the restoration of the discharge altogether, and those which contra-indicate particular modes of restoring it. As morbid conditions, which entirely contra-indicate the restoration of this discharge, we may mention extreme debility, either constitutional, or induced by previous disease, which prohibit our attempting its restoration so long as the debility continues: the time of critical discharges: high degrees of irritability and torpor: and a constitutional disposition to *deliquium animi*. The circumstances chiefly to be attended to in the regimen necessary respect: the adapting the diet and temperature to the disease under which the patient labours: the time of performing the operation: the state of the ingesta at that time: and the mode of the discharge.

## VII. *Of Errhines.*

These are medicines which, when topically applied to the internal membrane of the nose, excite sneezing, and increase the secretion without any mechanical irritation. They may be regarded as of two kinds, sternutatory, or those used for the purpose of general agitation chiefly, as tobacco, snuff, hellebore, euphorbium; and evacuant, or those designed to produce determination of the fluids to the nostrils, as asarum, beta, betonica.

The changes induced in the system, from the primary effects of errhines, are: violent agitation of the body: commotion of the nervous system: sudden changes in the circulation: a diminution of the quantity of circulating fluids: more free circulation through the mucous glands, on which the errhine acts: a change in the balance of circulation subsisting betwixt these and the neighbouring parts.

The use of errhines may hence be ascertained by the following results: 1. From their producing agitation of the system in general: whence they may be employed to discharge morbid accumulations of mucus in the cavities surrounding the nose. To remove a state of torpor in the nervous system. To obviate nervous affections of the convulsive or spasmodic kind. 2. From their producing determination to the nose: whence they may be employed to promote the secretion of mucus in the nose when morbidly diminished. To occasion derivation from parts morbidly affected in the neighbourhood of the nose. These indications may be illustrated and confirmed from practical observations concerning the effects of this class of medicines, when employed in cases of apoplexy, palsy, head-ach, and ophthalmies.

The cautions to be observed in the employment of errhines, as derived from their nature, respect chiefly: the agitation they produce in the system in general: and the change they occasion in determination, whether as producing a greater flow to the nose, or derivation from other parts. The conditions of the system chiefly requiring attention in the employment, are: infancy: old age: irritable and hæmorrhagic habits: those which are morbidly torpid: and those formerly accustomed to the frequent use of the same stimulus. The circumstances to be attended to in the regimen necessary, respect: the means of obviating inflammation when excited: and the avoiding sudden exposure to cold air.

The different individuals belonging to the class of errhines, are chiefly contra-indicated by the presence of the following morbid states: a high degree of plethora: morbid debility of the viscera: uncommon sensibility of the nose: preternatural determination to the nose: and ulceration of the nose or of neighbouring parts.

## VIII. *Of Sialagogues.*

Sialagogues are medicines which excite an uncommon flow of saliva. They stimulate the salivary glands, or their excretories. They increase the action of the vessels secreting saliva. They accelerate the circulation through the salivary glands, and through the blood-vessels in the neighbourhood of these. They produce a præternatural discharge of saliva, both in point of quantity and consistence. The changes induced in the system, from the primary effects of sialagogues, are: a change in the distribution of the fluids circulating through these vessels to which the action of the sialagogue extends, and through the vessels in the neighbourhood of these: a diminution of the quantity of circulating fluids in general: and a change in the state of the remaining mass, independently of the diminution of quantity. They may be distributed into topical, as squills, tobacco, peppers, and other aromatics; and general, as mercurial preparations.

The use of sialogogues may be determined as follows: 1. From their effects as changing the balance of circulation: whence they may be employed to diminish the impetus of the blood against parts morbidly affected in the neighbourhood of the salivary glands. To diminish the action of the vessels when morbidly increased in these neighbouring parts. To promote free circulation of the

blood through the salivary glands, when morbidly obstructed there. 2. From their effects, as producing evacuation: whence they may be employed to evacuate morbid accumulations of serum. To produce a thorough change in the fluids of the body, when morbidly vitiated.

These uses may be illustrated from practical observations in cases of tooth-ach, angina, dropsy, and siphilis.

The cautions to be observed in the employment of sialagogues, as derived from their nature, respect chiefly: the stimulus they occasion to the salivary glands and other neighbouring parts: the time required by the order of interna for the production of evacuation: the difficulty, perhaps, in some cases, the impossibility, of exciting salivation by means of the interna: and the debility induced in the system from excessive evacuation. The conditions of the system chiefly requiring attention in their employment, are: old age: constitutions habituated to sialagogues: peculiarities in constitution, determining the mercury to act on other parts than the salivary glands: menstruation; and pregnancy. Sialagogues are contra-indicated where there is an uncommon determination to the salivary glands; preternatural sensibility in them; deficient serosity; and general debility of the system.

### IX. *Of Emollients.*

By emollients are meant medicines which have a power of relaxing the living animal fibre, independently of mechanical action. They render the part to which they are immediately applied more soft and flexible than it was before. They excite a peculiar sensation indistinctly referred to the part to which they are applied. They produce, through the rest of the system, an effect in some degree analogous to that taking place in the part on which they more immediately act. The changes induced in the system from the primary effects of emollients are: a diminution of the power of cohesion in various parts of the animal body: a diminution of tonic power in the system: an increase of the capacity of containing vessels in the part on which they more particularly act, and in some degree in the system in general; and an increase of irritability and sensibility through the entire frame.

They may be regarded as humectant, of which we have examples in warm water, warm vapour, and warm baths: laxative, as marshmallows, mallows, white lily root; lubricative, as bland oils, suet, hogs-lard: atonic, as opium, foot-bath.

The curative indications of emollients may be collected hence. 1. From their producing a change in the state of the moving solids. Hence they may be employed to restore the natural flexibility to parts morbidly rigid. To diminish a morbid increase of tonic power. 2. From their producing a change in the state of the containing vessels. Hence they may be employed to obviate the effects of morbid distention. To remove obstructions. These indications may be illustrated and confirmed from practical observations concerning the effects of this class of medicines, as employed in cases of contraction, rigidity, and tumor. The cautions to be observed in the employment of emollients, as derived from their nature, chiefly respect; their influence as acting on the system in general: and the effects of a degree of laxity induced in particular parts, higher than is natural to these. The conditions of the system which chiefly require attention in their employment are: the period of youth: delicacy of habit and debility. The circumstances chiefly to be attended to in the necessary regimen, respect: the temperature and air in which the patient is kept: and the mode of applying the emollient. The class of emollients are chiefly contra-indicated by the presence of the following morbid states: a high degree of morbid relaxation in the system in general: and a peculiar sensibility of the moving fibres.

### X. *Of Refrigerants.*

These are medicines which, as their name implies, are supposed to diminish the heat of the living body, not by the application of an actual cold, but by a power peculiar to themselves.

They may be considered under the two divisions of acids, or acetous fruits, as tamarinds, berberries, lemons, wood-sorrel; and neutral salts, as nitre, Glauber's salt, sal polychrest. They may hence be usefully employed in cases of febrile heat, or of general plethora; and are a useful auxiliary to the tribe of refrigerant cathartics. 2. As sedatives, to diminish undue irritability and action of any of the vascular systems: and are hence usefully conjoined with the sedatives, more properly so called, of Class XV. of this system. In the employment of these medicines, attention should be paid to their power of diminishing action, and either generally checking the secretions of the system, or augmenting some by a diminution of others. Hence they are contra-indicated in cases of chlorosis, leucophlegmatic habits, and predispositions to dropsical affections. We enlarge the less, however, upon this subject, because the indications and contra-indications are closely connected, as we have just observed, with the articles and the remarks offered upon Class XV. of which, in various systems of therapeutics, they merely constitute a separate division.

### XI. *Of Astringents.*

These are medicines which possess a power of condensing the animal fibre, without the aid of mechanical action. In general they are found to excite a peculiar sensation referred to the part to which they are applied; if to the organs of taste, a sense of dryness. They produce a remarkable corrugation in the parts on which they more immediately act. They occasion, in some degree, a similar affection through the rest of the system. Some individuals belonging to this class produce an evident condensation in dead animal fibres. The changes induced in the system from the primary effects of astringents, are: an increase of the power of cohesion in various parts of the animal body: an increase of what may be termed the tonic power in the system: a diminution of the capacity of containing vessels in the system: a diminution of irritability, and perhaps, in some degree, of sensibility.

Astringents may be divided into styptic, of which we have examples in most metallic oxyds, as well as in aluminous earths: corrugant, as rose-leaves, galls, oak-bark; indurant, as alcohol and acids; and tonic, as exercise, cold, and friction. The indications of cure which the class of astringent medicines are capable of fulfilling may be deduced from the following sources. 1. From the alteration they produce on the state of the moving solids: whence they may be employed to obviate original delicacy. To restore natural compactness to parts morbidly relaxed. To restore diminished tonic power. To diminish mobility when

morbidly increased. 2. From the alteration they preduce on the state of the containing vessels: whence they may be employed to diminish secretions morbidly augmented. To increase the power of retaining excrementitious matters when morbidly diminished. To produce a constriction on the orifices of ruptured vessels.

These indications may be illustrated and confirmed from practical observations concerning the effects of astringents in cases of hysteria, epilepsy, hæmorrhage, and diarrhœa.

The cautions to be observed in the employment of astringents, as derived from their nature, chiefly respect the stimulant and caustic powers possessed by many individuals belonging to the class: the effects of an alteration produced in the solids if carried beyond the natural state: and, in a particular manner, their influence as diminishing secretions; and as increasing the power of the system for the retention of excrementitious matters. The conditions of the system which chiefly require attention in their employment are, old age, melancholic habits, and particular morbid affections of the stomach. The circumstances chiefly to be attended to in the regimen necessary, respect: the avoiding a relaxing diet: and the keeping the patient in cool temperature and dry air.

Astringents are chiefly contra-indicated by the presence of the following morbid states: a high degree of rigidity in the system in general: remarkable insensibility in the moving fibres: and particular diminution of the excretions from the body.

### XII. *Of Tonics.*

The medicines thus denominated are those which increase the tone of the muscular fibre, are supposed to brace the system when constitutionally relaxed, and give it vigour when debilitated by immediate disease. They may be divided into stimulants, as various preparations of mercury, iron, zinc, and other metals; and astringents, as chamomile-flowers, myrrh, Peruvian and other barks, and gentian. It is hence obvious that this class of medicines has a near relation to those noticed in the class that immediately precedes and immediately follows it. On which account we shall dismiss it with a single additional observation or two. The changes induced in the system by the use of tonics are, increase of muscular power, greater moderation, and a firmer stroke of the pulse, increased desire for food, and an augmented vivacity of the animal spirits. Hence their use is clearly indicated in all cases in which there is a deficiency of these natural powers or desires. They are, therefore, contra-indicated by the existence of a plethoric habit, constitutional predisposition to maniacal affections, or topical hæmorrhages; and a sanguineous temperament.

### XIII. *Of Stimulants.*

These, like the last, are medicines which have a power of exciting the animal energy; but for the most part topically, rather than generally, or for a shorter period of time. They occasion a particular sensation referred to the part more immediately acted upon; frequently a sense of pain. They increase the action of muscular fibres in that part, particularly in its vessels. They increase the energy of the sensorium. They increase the nervous energy in the moving fibres through the system in general. The changes induced in the system from the primary effects of stimulants are: acceleration of the motion of the blood in the part to which they are particularly applied: an increase of the force of circulation in the system in general: an increase of excitement in the powers of sensation: and an augmentation of mobility and vigour in the muscular organs. They may be divided into the following heads: topical, of which we have examples in mustard-seed, cantharides, mercurial preparations: diffusible, of which we have instances in volatile alkali, electricity, heat: cardiac, such as cinnamon, nutmegs, and other spices, and wine. The indications of cure which stimulants are capable of fulfilling may be derived from the three following sources. 1. From their affecting the state of circulation: whence they may be employed to facilitate the passage of blood through parts in which it is morbidly obstructed. To augment the force and celerity of the circulation where it is morbidly slow and weak. 2. From their acting on the powers of sensation: whence they may be employed to quicken the senses where morbidly dull. To rouse the mental faculties when in a lethargic state. To exhilarate a despondent condition. 3. From their acting on the moving fibres: whence they may be employed to restore the power of motion where morbidly deficient. To increase the strength of motion when morbidly weak. These indications may be illustrated and confirmed from practical observations concerning the effects of this class of medicines, as employed in cases of syncope, apoplexy, and palsy. The cautions to be observed in employing stimulants, are the pain they excite; the violence of circulation; or the flow of the animal spirits which they produce; the mobility of the system which arises from their employment; and the collapse, which is the consequence of high and sudden excitement. The conditions of the system which chiefly require attention in their employment are delicate and irritable habits. The circumstances chiefly to be attended to in the regimen necessary, respect the diet and temperature best adapted to the stimulant employed; and the nature of the particular disease in which it is used. The individuals belonging to this class are chiefly contra-indicated by the presence of the following morbid states: a high degree of morbid irritability; the circulation uncommonly accelerated; and a præternatural disposition to hæmorrhage.

### XIV. *Of Antispasmodics.*

By these are meant whatever has a power of allaying inordinate motions in the system, particularly those involuntary contractions which take place in muscles naturally subject to the command of the will; they counteract and remove various causes exciting contractions; they diminish the influence of the nervous energy in the parts spasmodically affected. The changes induced in the system, from the primary effects of antispasmodics, are the restoration of the proper balance of the nervous energy in different parts of the body; the restoration of the due influence of the will; and the restoration of the natural state of tension to the muscles. The different articles referred to the class of antispasmodics may be distributed into the two following orders: stimulant, as volatile alkali, essential oils, ether; sedative, as camphor, musk, opium. As the action of the medicines referred to this class depends entirely upon the presence of a morbid state, what has been advanced with regard to their nature will, in a good measure, serve to illustrate their use. The indications of cure, which, as antispasmodics, they are capable of fulfilling, are entirely to be derived from their

influence on the nervous energy. Hence they may be used to remove spasmodic contractions taking place in different muscles. To allay convulsive agitations. These indications may be illustrated and confirmed from practical observations concerning the effects of antispasmodics, as employed in cases of epilepsy and cramp. The circumstances claiming attention in the employment of antispasmodics, which respect either the nature of the medicine itself, the condition of the patient in whom it is used, or the necessary regimen, are different according to the particular order which is employed. They will easily be understood from what has already been said of stimulants and sedatives considered as separate classes.

There is, perhaps, no condition of the body which will contra-indicate the use of every individual referred to the class of antispasmodics. But the same morbid conditions, which have already been mentioned, as contra-indicating the use of stimulants and sedatives, will likewise contra-indicate the orders of antispasmodics denominated from these classes.

### XV. *Of Narcotics.*

These are medicines which have a power of diminishing the animal energy, and hence inducing torpor and sleep, during which this energy is usually recruited and restored. They diminish the sensibility of the part to which they are particularly applied. They diminish the action and tonic power of its muscular fibres. They produce a peculiar sensation in the system in general. They diminish the energy of the sensorium.

The changes induced in the system, from the primary effects of narcotics, are: retardation of the blood's motion in the part more immediately acted upon: diminution of the force of circulation in the system in general: diminution of excitement in the powers of sensation and reflection: and diminution of vigour in muscular action through the system.

Narcotics may be divided into those which act directly and those which act indirectly: of the former tribe are poppies, opium, hyoscyamus, hops, and lettuce: of the latter neutral salts and acids. Their use may be calculated from the following sources: 1. From their affecting the circulation: whence they may be employed to diminish the force and celerity of the blood's motion where morbidly augmented. To diminish the impetus of the blood against parts morbidly affected. 2. From their acting on the powers of sensation: whence they may be employed to abate violent pain. To procure sleep in cases of præternatural watchfulness. 3. And from their acting on the moving fibres: whence thay may be employed to restrain inordinate motions, and to moderate excessive evacuations. These indications may be illustrated and confirmed from practical observations concerning the effects of this class of medicines, as employed in cases of inflammation, tooth-ach, and dysentery. The cautions to be observed in the employment of this class of medicines, as derived from their nature, chiefly respect: the insensibility which they produce: the atonia they occasion in the muscular fibres, particularly in the blood-vessels: and the suspension of the powers of sensation with which they are sometimes followed.—The conditions of the system which chiefly require attention in their employment are: irritable and relaxed habits: and those who are constitutionally liable to delirium from their use.—The circumstances chiefly to be attended to in the necessary regimen respect: the regulation of the dose of the medicine employed: the avoiding all stimulating causes during their operation: and the guarding against their becoming habitual to the system. Narcotics are chiefly contra-indicated by a præternaturally languid circulation; a peculiarly lethargic disposition, and great morbid torpor in the system.

### XVI. *Of Anthelmintics.*

By anthelmintics are meant those medicines which, without endangering the life of the patient, are effectual in procuring the removal of worms lodged in the human body. The direct effects arising from this class of medicines are intended to be exerted only on the worms themselves; but there are, at the same time, few, if any medicines, which, when employed with this intention, do not also produce some effect on the animal body: to enter upon the consideration of these, however, would be foreign to this class. As anthelmintics, they produce the following effects: they kill worms to which they come to be applied in the body: they expel them from the body: they prevent their generation in the body. The only changes produced in the system that are here to be considered, are those which arise from their action upon the worms themselves. These are the removal of an almost infinite variety of different symptoms which worms produce whilst lodged in the body. Anthelmintics may be subdivided into the following tribes: poisonous, as quicksilver, tin, sulphur: lubricant, as oil of olives and oil of linseed; tonic, as savin tansy, santonicum: cathartic, as scammony, jalap, aloes, gamboge. Their indications are manifested from the following considerations: 1. From their action on the worms themselves: whence they may be employed to kill worms lodged in different parts of the human body: 2. From their action on the system: whence they may be used to promote the expulsion of worms from the body, whether dead or alive. To prevent the generation of worms in the body. These indications may be illustrated and confirmed from practical observations concerning the use of anthelmintics in cases of atrophia, diarrhœa, and vomitus.

The cautions to be observed in the employment of anthelmintics, as derived from their nature, chiefly respect the other effects they will have upon the system, independent of their action as anthelmintics.—The conditions of the system which chiefly require attention in their employment are infancy, delicacy of habit, and other similar affections. In the regimen, farinaceous food should be avoided; and exercise should be encouraged.

There are, perhaps, no morbid conditions of the system, during which the removal of worms from the body may not, with propriety, be attempted by one means or other. But, although it may be doubtful whether there are morbid conditions contra-indicating the whole class; yet it cannot be questioned that there are many contra-indicating particular orders. Among others may be mentioned, an abraded or inflamed state of the intestines contra-indicating the poisonous; accumulations of feces in the first passages contra-indicating the lubricant; a peculiar sensibility of the stomach contra-indicating the tonic; and topical inflammation of the intestines, previous looseness, or a high degree of inanition contra-indicating the cathartic.

XVII. *Absorbents.*

This term is used differently by different therapeutists. Generally speaking, it implies medicines which, possessing no acrimony in themselves, possess, notwithstanding, a power of destroying acidities in the stomach and bowels: at other times, however, it is employed more largely to indicate those substances as well which increase the general action of the absorbent system. They may hence be divided into two kinds, the calcareous, as burnt hartshorn, oyster-shells, and chalk; and stimulative, as burnt sponge, salt of hartshorn, and alkalis. They are hence indicated in peculiar acrimonies or peculiar torpidities of the system generally, or particular organs of the system: and may hence be employed beneficially in acidities of the stomach, heart-burn, and excesses in vinous potation: as well as in strumous and other leucophlegmatic affections of the glandular system, especially in bronchocele, or the disease termed, provincially, Derbyshire-neck, and scirrhosities of either extremity of the stomach. Their use may be collected from practical attention to these diseases, in which, notwithstanding, they commonly require to be connected with more active applications. On this last account they may generally be employed without apprehension: yet in cases of acidity of the stomach, they have often been used to an extent that has produced worse diseases than the malady they were intended to remedy, and have laid the foundation for calcareous concretions that have resisted the application of almost every purgative, and formed indurations almost as troublesome as the calcareous concretions of the bladder: concretions which have only been removed by a long use of active lithontriptics.

MATE'RIAL. *a.* (*materiel*, French.) 1. Consisting of matter; corporeal; not spiritual (*Davies*). 2. Important; momentous; essential (*Whit.*). 3. Not formal: as, though the *material* action was the same, it was formally different.

MATE'RIALIST. *s.* (from *material.*) One who denies spiritual substances (*Dryden*).

MATERIALISTS, a sect in the ancient church, composed of persons who, being prepossessed with that maxim in the ancient philosophy, *Ex nihilo nihil fit*, "Out of nothing nothing can arise," had recourse to an internal matter, on which they supposed God wrought in the creation; instead of admitting God alone as the sole cause of the existence of all things. Tertullian vigorously opposes the doctrine of the materialists, in his treatise against Hermogenes, who was one of their number.

Materialists is also a name given to those who maintain that the soul of man is material; or that the principle of perception and thought is not a substance distinct from the body, but the result of corporeal organization. There are others, called by this name, who have maintained that there is nothing but matter in the universe; and that the Deity himself is material. See SPINOSISM.

MATERIA'LITY. *s.* (*materialité*, Fr.). Corporeity; material existence; not spirituality (*Boyle*).

MATE'RIALLY. *ad.* (from *material.*) 1. In the state of matter (*Boyle*). 2. Not formally (*South*). 3. Importantly; essentially (*Spenser*).

MATE'RIALNESS. *s.* (from *material.*) State of being material.

MATE'RIALS. *s.* (*materiaux*, French.) The substance of which any thing is made (*Brown*).

MATE'RIATE. MATE'RIATED. *a.* (*materiatus*, Latin.) Consisting of matter.

MATERIA'TION. *s.* (from *materia*, Lat.) The act of forming matter (*Brown*).

MATE'RNAL. *a.* (*maternus*, Latin.) Motherly; befitting or pertaining to a mother (*Dryden*).

MATE'RNITY. *s.* (from *maturnus*, Lat.) The character or relation of a mother.

MATHEMA'TICAL. MATHEMA'TIC. *a.* (*mathematicus*, Latin.) Considered according to the doctrine of the mathematicians (*Denham*).

MATHEMA'TICALLY. *ad.* According to the laws of the mathematical sciences (*Bentley*).

MATHEMATI'CIAN. *s.* (*mathematicus*, Latin.) A man versed in the mathematics (*Addison*).

MATHEMATICS, the science that considers magnitudes either as computable or measurable. The word in its original, μαθησις, signifies discipline, or science in the general; and seems to have been applied to the doctrine of quantity, either by way of eminence, or because, this having the start of all other sciences, the rest took their common name therefrom. See SCIENCE.

For the origin of mathematics, Josephus dates it before the flood, and makes the sons of Seth observers of the course and order of the heavenly bodies: he adds, that, to perpetuate their discoveries, and secure them from the injuries either of a deluge or a conflagration, they had them engraven on two pillars, the one of stone, the other of brick; the former of which he says was standing in Syria in his days.

The first who cultivated mathematics after the flood were the Assyrians and Chaldeans; from whom, the same Josephus adds, they were carried by Abraham to the Egyptians; who proved such notable proficients, that Aristotle makes no scruple to fix the first rise of mathematics among them. From Egypt, 584 years before Christ, they passed into Greece through the hands of Thales; who having learned geometry of the Egyptian priests, taught it in his own country. After Thales, comes Pythagoras; who, among other mathematical arts, paid a particular regard to arithmetic; fetching the greatest part of his philosophy from numbers: he was the first, as Laertius tells us, who abstracted geometry from matter; and to him we owe the doctrine of incommensurable magnitude, and the five regular bodies, besides the first principles of music and astronomy. Pythagoras was seconded by Anaxagoras, Œnopides, Briso, Antipho, and Hippocrates of Scio; who all applied themselves particularly to the quadrature of the circle, the duplicature of the cube, &c. but the last with most success: this

last is also mentioned by Proclus, as the first who compiled elements of mathematics.

Democritus excelled in mathematics as well as physics; though none of his works in either kind are extant, the destruction of which some authors ascribe to Aristotle. The next in order is Plato, who not only improved geometry, but introduced it into physics, and so laid the foundation of solid philosophy. Out of his school proceeded a crowd of mathematicians. Proclus mentions 13 of note; among whom was Leodamus, who improved the analysis first invented by Plato; Theætetus, who wrote elements; and Archiates, who has the credit of being the first who applied mathematics to use in life. These were succeeded by Neocles and Theon, the last of whom contributed to the elements. Eudoxus excelled in arithmetic and geometry, and was the first founder of a system of astronomy. Manechmus invented the conic sections, and Theudius and Hermotimus improved the elements.

As for Aristotle, his works are so stored with mathematics, that Blancanus compiled a whole book of them: out of his school came Eudemus and Theophrastus; the first of whom wrote of numbers, geometry, and invisible lines; the latter, a mathematical history. To Aristeus, Isidorus, and Hypsicles, we owe the books of solids; which, with the other books of elements, were improved, collected, and methodised by Euclid, who died 284 years before Christ.

An hundred years after Euclid, came Eratosthenes and Archimedes. Cotemporary with the latter was Conon, a geometrician and astronomer. Soon after came Apollonius Pergæus; whose conics are still extant. To him are likewise ascribed the 14th and 15th books of Euclid, which are said to have been contracted by Hypsicles. Hipparchus and Menelaus wrote on the subtenses in a circle, the latter also on spherical triangles: Theodosius's three books of spherics are still extant. And all these, Menelaus excepted, lived before Christ.

A. D. 70. Ptolemy of Alexandria was born; the prince of astronomers, and no mean geometrician: he was succeeded by the philosopher Plutarch, of whom we have still extant some mathematical problems. After him came Eutocius, who commented on Archimedes, and occasionally mentions the inventions of Philo, Diocles, Nicomedes, Sporus, and Heron, on the duplicature of the cube. To Ctesebes of Alexandria we are indebted for pumps; and Geminus, who lived soon after, is preferred by Proclus to Euclid himself.

Diophantus of Alexandria was a great master of numbers, and the first Greek writer on algebra. Among others of the ancients, Nicomachus is celebrated for his arithmetical, geometrical, and musical works: Serenus, for his books on the section of the cylinder; Proclus, for his commentaries on Euclid; and Theon has the credit among some of being author of the books of elements ascribed to Euclid. The last to be named among the ancients is Pappus of Alexandria, who flourished about the year of Christ 400, and is justly celebrated for his books of mathematical collections, still extant.

Mathematics are commonly distinguished into speculative and practical, pure and mixed.

*Speculative mathematics*, is that which barely contemplates the properties of things: and

*Practical mathematics*, that which applies the knowledge of those properties to some uses in life.

*Pure mathematics* is that branch which considers quantity abstractedly, and without any relation to matter or bodies.

*Mixed mathematics* considers quantity as subsisting in material being; for instance, length in a pole, depth in a river, height in a tower, &c.

*Pure mathematics*, again, either considers quantity as discrete, and so computable, as arithmetic; or as concrete, and so measureable, as geometry.

*Mixed mathematics* are very extensive, and are distinguished by various names, according to the different subjects it considers, and the different views in which it is taken; such as astronomy, geography, optics, hydrostatics, navigation, &c. &c.

Pure mathematics has one peculiar advantage, that it occasions no contests among wrangling disputants, as happens in other branches of knowledge: and the reason is, because the definitions of the terms are premised, and every person that reads a proposition has the same idea of every part of it. Hence it is easy to put an end to all mathematical controversies, by shewing, either that our adversary has not kept to his definitions, or has not laid down true premises, or else that he has drawn false conclusions from true principles; and in case we are not able to do either of these, we must acknowledge the truth of what he has proved.

It is true, that in mixed mathematics, where we reason mathematically upon physical subjects, such just definitions cannot be given as in geometry: we must therefore be content with descriptions; which will be of the same use as definitions, provided we be consistent with ourselves, and always mean the same thing by those terms we have once explained.

Dr. Barrow gives a very elegant description of the excellence and usefulness of mathematical knowledge, in his inaugural oration, upon being appointed Professor of Mathematics at Cambridge. The mathematics, he observes, effectually exercise, not vainly delude, nor vexatiously torment studious minds with obscure subtilties, but plainly demonstrate every thing within their reach, draw certain conclusions, instruct by profitable rules, and unfold pleasant questions. These disciplines likewise enure and corroborate the mind to a constant diligence in study; they wholly deliver us from a credulous simplicity, most strongly fortify us against the vanity of scepticism, effectually re-

strain us from a rash presumption, most easily incline us to a due assent, and perfectly subject us to the government of right reason. While the mind is abstracted and elevated from sensible matter, distinctly views pure forms, conceives the beauty of ideas, and investigates the harmony of proportion; the manners themselves are sensibly corrected and improved, the affections composed and rectified, the fancy calmed and settled, and the understanding raised and excited to more divine contemplations.

For the history of mathematics consult Wallis, Montucla, Kaestner, Hutton, Bossut, Bailly, &c. See also the words ALGEBRA, ARITHMETIC, ASTRONOMY, DYNAMICS, FLUXIONS, GEOMETRY, &c. in this work.

MATHEMATICAL INSTRUMENTS, such instruments as are usually employed by mathematicians, as COMPASSES, SCALES, QUADRANTS, &c. See the respective words.

MATHER (Dr. Cotton), an eminent American divine, born at Boston in New England, in the year 1663. He was educated in Harward college, and in 1684 became minister of Boston; in the diligent discharge of which office he spent his life, and promoted several excellent societies for the public good: particularly one for suppressing disorders, one for reforming manners, and a society of peace-makers, whose professed business it was to compose differences and prevent law-suits. His reputation was not confined to his own country, for in 1710 the university of Glasgow sent him a diploma for the degree of doctor in divinity, and in 1714 the Royal Society of London chose him one of their fellows. He died in 1728; and is said to have published in his life-time 382 pieces, including single sermons, essays, &c. yet several were of a larger size, among which was Magnalia Christi Americana, or an Ecclesiastical History of New England, from its first planting in 1620 to 1698, folio. But the most remarkable of all his works was that in which, like Glanville, he defended the doctrine of witchcraft. We shall content ourselves with giving the title at large, which is as follows: "The Wonders of the Invisible World; being an account of the trials of several witches lately executed in New England, and of several remarkable curiosities therein occurring. Together with, 1. Observations on the nature, the number, and the operations of the devils. 2. A short narrative of a late outrage committed by a knot of witches in Swedeland; very much resembling and so far explaining that under which New England has laboured. 3. Some counsels directing a due improvement of the terrible things lately done by the unusual and amazing range of evil spirits in New England. 4. A brief discourse upon the temptations which are the more ordinary devices of Satan. By Cotton Mather: published by the special command of his excellency the governor of the province of Massachuset's Bay in New England." Printed first at Boston in New England, and reprinted at London in 1736, 4to.

MATHE'SIS. *s.* (μαθησις.) The doctrine of mathematics (*Pope*).

MA'TIN. *a.* (*matine*, French.) Morning; used in the morning (*Milton*).

MA'TIN. *s.* Morning (*Shakspeare*).

MA'TINS. *s.* (*matines*, French.) Morning worship (*Cleaveland. Stillingfleet*).

MATLOCK, a village in Derbyshire, situate on the Derwent, four miles N. of Wirksworth. It is an extensive straggling place, built in a romantic style, on the steep side of a mountain. A little to the S. is Matlock bath, famous for two warm baths, called the Old and New Bath, which are much frequented in the bathing season. There are good accommodations for the company who resort to the baths, and the poorer inhabitants are supported by the sale of petrifactions, crystals, &c. The cliffs of the rocks produce a great number of trees, whose foliage adds greatly to the beauty of the place.

MATLOCK WATER. A mineral water in the neighbourhood of the place whose name it bears. It is found to contain a small quantity of a neutral salt, probably muriat of soda, and about as much of an earthy salt, which is chiefly calcareous. No traces of iron are discoverable by any test, nor does there appear to be any excess of carbonic acid, as in the Bristol Hotwell. It may be employed in all those cases where a pure diluent drink is advisable; but it is principally used as a tepid bath, or at least one that comes to the extreme limits of a cold bath.

MATRASS, CUCURBIT, or BOLTHEAD, among chemists. See CHEMISTRY, CUCURBIT, and LABORATORY.

MATRICA'LIA. (from *matrix*, the womb.) Medicines employed in diseases of this organ.

MATRICA'RIA. Mother-wort. In botany, a genus of the class syngenesia, order polygamia superflua. Receptacle naked, cylindrico-conic; downless; calyx flattish, imbricate; the scales scarious at the margin. Three species: one of the Cape; two of Europe, of which last, M. chamomilla is common to our own wastes. This species is sometimes, but erroneously, named feverfew. The real feverfew is PYRETHMUM, which see.

The leaves of the M. suaveolens have a strong, not agreeable smell, and a moderately bitter taste, both which they communicate, by warm infusion, to water and rectified spirit. The watery infusions, inspissated, leave an extract of considerable bitterness, and which discovers also a saline matter, both to the taste, and in a more sensible manner by throwing up to the surface small crystalline efflorescences in keeping. The peculiar flavour of the matricaria exhales, in the evaporation, and impregnates the distilled water, on which also a quantity of essential oil is found floating. The quantity of spiritous extract, according to Cartheuser's experiments, is only about one-sixth the weight of the dry leaves, whereas the watery extract amounts to near one half. This plant is evi-

dently the parthenium of Dioscorides, since whose time it has been very generally employed for medical purposes. In natural affinity it ranks with camomile and tansy, and its sensible qualities shew it to be nearly allied to them in its medicinal character. Bergius states its virtues to be tonic, stomachic, resolvent, and emmenagogue. It has been given successfully as a vermifuge, and for the cure of intermittents; but its use is most celebrated in female disorders, especially in hysteria; and hence it is supposed to have derived the name matricaria. Its smell, taste, and analysis, prove it to be a medicine of considerable activity.

MATRICE, or MATRIX. See MATRIX.

MATRICE, or MATRIX, in dying, is applied to the five simple colours, whence all the rest are derived or composed. These are, the black, white, blue, red, and yellow or root colour. See DYING.

MATRICE, or MATRICES, used by the letter-founders, are those little pieces of copper or brass, at one end whereof are engraven, dent-wise, or *en creux*, the several characters used in the composing of books.

Each character, vergula, and even each point, in a discourse, has its several matrix; and, of consequence, its several puncheon to strike it. They are the engravers on metal, that cut, or grave, the matrices.

When types are to be cast, the matrice is fastened to the end of a mould, so disposed, as that when the metal is poured on it, it may fall into the creux, or cavity of the matrice, and take the figure and impression thereof.

MATRICES, used in coining, are pieces of steel, in form of dyes; whereon are engraven the several figures, arms, characters, legends, &c. wherewith the species are to be stamped.

MA'TRICIDE. *s.* (*matricidium*, Latin.) 1. Slaughter of a mother (*Brown*). 2. (*matricida*, Latin.) A mother killer (*Ainsworth*).

*To* MATRI'CULATE. *v. a.* (from *matriculo*, Latin.) To enter or admit to a membership of the universities of England; to enlist (*Walton*).

MATRI'CULATE. *s.* (from the verb.) A man matriculated (*Arbuthnot*).

MARTRICULA'TION. *s.* (from *matriculate.*) The act of matriculating (*Ayliffe*).

MATRIMO'NIAL. *a.* (*matrimonial*, Fr.) Suitable to marriage; pertaining to marriage; connubial; nuptial; hymeneal (*Dryden*).

MATRIMO'NIALLY. *ad.* According to the manner or laws of marriage (*Ayliffe*).

MA'TRIMONY. *s.* (*matrimonium*, Latin.) Marriage; the nuptial state; the contract of man and wife; nuptials. See MARRIAGE.

MATRIMONY, a game at cards, so called from the resemblance of its general course to the course of matrimony, as it is sometimes found in high life.

Matrimony may be played by any number of persons from five to fourteen. This game is composed of five chances, usually marked on a board or sheet of paper, as follows:

Best
The ace of Diamonds turned up.

Confederacy
King and Knave.

INTRIGUE,
OR
QUEEN AND KNAVE.

Matrimony
King and Queen.

Pairs
The Highest.

The ace of diamonds turned up takes the whole pool, but when in hand ranks only as any other ace, and if not turned up, nor any ace in hand, then the king, or next superior card, wins the chance styled best.

The game is generally played with counters, and the dealer stakes what he pleases on each or any chance, the other players depositing each the same quantity, except one; that is, when the dealer stakes twelve, the rest of the company lay down eleven each. After this, two cards are dealt round to every one, beginning on the left, then to each one another card turned up, and he who so happens to get the ace of diamonds sweeps all; if it is not turned up, then each player shews his hand, and any of them having matrimony, intrigue, &c. takes the counters on that point; and when two or more people happen to have a similar combination, the eldest hand has the preference, and should any chance not be gained, it stands over to the next deal.

MATRIX. (*matrix*, μητρη.) The womb. See UTERUS.

MATRIX is also applied to places proper for the generation of vegetables, minerals, and metals. Thus the earth is the matrix wherein seeds sprout; and marcasites are by many considered as the matrices of metals.

MA'TRON. *s* (*matrone*, French; *matrona*, Latin.) 1. An elderly lady (*Tatler*). 2. An old woman (*Pope*).

MATRONS (Jury of). When a widow feigns herself with child in order to exclude the next heir, and a suppositiitous birth is suspected to be intended, then, upon the writ *de ventre inspiciendo*, a jury of women is to be impanelled to try the question whether the woman is with child or not. So, if a woman is convicted of a capital offence, and, being condemned to suffer death, pleads in stay of execution, that she is pregnant, a jury of matrons is impanelled to inquire into the truth of the allegation; and if they find it true, the convict is respited till after her delivery.

MATRONA, in ancient geography, a river separating Gallia Celtica from the Belgica

(Cesar). Now the Marne, which rising in Champaign near Langres, runs north-west, and then west, and passing by Meaux falls into the Seine at Charenton, two leagues to the east of Paris.

MA'TRONAL. *a.* (*matronalis*, Latin.) Suitable to a matron; constituting a matron (*Bacon*).

MATRONALIA, a Roman festival instituted by Romulus, and celebrated on the kalends of March, in honour of Mars. It was kept by matrons in particular, and bachelors were entirely excluded from any share in the solemnity. The men during this feast sent presents to the women, for which a return was made by them at the Saturnalia.

MA'TRONLY. *a.* (*matron* and *like.*) Elderly; ancient (*L'Estrange*).

MATROSSES, a name heretofore given to soldiers in the artillery, who are next to the gunners, and assist them in loading, firing, and spunging the great guns. They are now, however, called second gunners. They carry firelocks, and march along with the store-waggons, both as a guard, and to give their assistance in case a waggon should break down.

MATSYS (Quintin), an historical and portrait painter, born at Antwerp in 1460. He was brought up to the trade of a blacksmith, which he abandoned, and became a most excellent artist. A descent from the cross, in the cathedral of Antwerp, is spoken of as his masterpiece. He died in 1529. His son John was also a good painter, but not equal to the father.

MATTEI (Paolo da), an historical painter, born at Naples in 1661. He became the disciple of Luca Giordano, and acquired an exact method of imitating the works of the greatest masters. He died in 1728.

MA'TTER. *s.* (*matiere*, Fr. *materia*, Lat.) 1. Body; substance extended (*Newton*). 2. Materials; that of which any thing is composed (*Bacon*). 3. Subject; thing treated (*Dryden*). 4. The whole; the very thing supposed (*Tillotson*). 5. Affair; business (*Bacon*). 6. Cause of disturbance (*Shakspeare*). 7. Subject or suit of complaint (*Acts*). 8. Import; consequence; importance; moment (*Shakspeare*). 9. Thing; object; that which has some particular relation (*Bacon*). 10. Question considered (*South*). 11. Space or quantity nearly computed (*L'Estrange*). 12. Purulent running (*Wiseman*). 13. *Upon the* MATTER. With respect to the main; nearly: out of use (*Sanderson*).

MATTER, in physiology, whatever is extended and capable of making resistance: hence, because all bodies, whether solid or fluid, are extended, and do resist, we conclude that they are material, or made up of matter. That matter is one and the same thing in all bodies, and that all the variety we observe arises from the various forms and shapes it puts on, seems very probable, and may be concluded from a general observation of the procedure of nature in the generation and destruction of bodies. Thus, for instance, water, rarified by heat, becomes vapour; great collections of vapours form clouds; these condensed descend in the form of hail or rain; part of this collected on the earth constitutes rivers; another part mixing with the earth enters into the roots of plants, and supplies matter to, and expands itself into various species of vegetables. In each vegetable it appears in one shape in the root, another in the stalk, another in the flowers, another in the seeds, &c. From hence various bodies proceed; from the oak, houses, ships, &c. from hemp and flax we have thread; from thence our various kinds of linen; from thence garments; these degenerate into rags, which receive from the mill the various forms of paper; hence our books.

According to sir Isaac Newton, it seems highly probable, that God in the beginning formed matter into solid, massy, impenetrable, moveable particles, or atoms, of such sizes and figures, and with such other properties, and in such proportion to space, as most conduced to the end for which he formed them; and that these primitive particles being solids, are incomparably harder than any porous bodies compounded of them, even so hard as never to wear or break in pieces; no ordinary power being able to divide what God himself made one in the first creation. While these particles continue entire, they may compose bodies of one and the same nature and texture in all ages; but should they wear away, or break in pieces, the nature of things depending on them may be changed. Water and earth, composed of old worn particles and fragments of particles, would not be of the same nature and texture now, with water and earth composed of entire particles in the beginning; and therefore, that nature may be lasting, the changes of corporeal things are to be placed only in the various separations and new associations of motions of these permanent particles, compound bodies being apt to break, not in the midst of solid particles, but where these particles are laid together, and only touch in a few points.

Dr. Berkeley argues against the existence of matter itself; and endeavours to prove that it is a mere *ens rationis*, and has no existence out of the mind. Some late philosophers have advanced a new hypothesis concerning the nature and essential properties of matter.

The first of these who suggested, or at least published an account of this hypothesis, was M. Boscovich, in his Theoria Philosophiæ Naturalis. He supposes, that matter is not impenetrable, but that it consists of physical points only, endued with powers of attraction and repulsion, taking place at different distances, that is, surrounded with various spheres of attraction and repulsion; in the same manner as solid matter is generally supposed to be. Provided therefore that any body move with a sufficient degree of velocity, or have sufficient momentum to overcome any power of repulsion that it may meet with, it will find no difficulty in making its way through any body whatever. If the velocity of such a body in motion be sufficiently great, Boscovich contends, that the particles of

any body through which it passes will not even be moved out of their place by it.

With a degree of velocity something less than this, they will be considerably agitated, and ignition might perhaps be the consequence, though the progress of the body in motion would not be sensibly interrupted; and with a still less momentum it might not pass at all. Mr. Michell, Dr. Priestley, and some others of our own country, are of the same opinion. See Priestley's History of Discoveries relating to Light, p. 390. In conformity to this hypothesis, this author maintains, that matter is not that inert substance that it has been supposed to be; that powers of attraction or repulsion are necessary to its very being, and that no part of it appears to be impenetrable to other parts. Accordingly, he defines matter to be a substance, possessed of the property of extension, and of powers of attraction or repulsion, which are not distinct from matter, and foreign to it, as it has been generally imagined, but absolutely essential to its very nature and being: so that when bodies are divested of these powers, they become nothing at all. In another place, Dr. Priestley has given a somewhat different account of matter: according to which it is only a number of centres of attraction and repulsion; or more properly of centres, not divisible, to which divine agency is directed; and as sensation and thought are not incompatible with these powers, solidity, or impenetrability, and consequently a vis inertiæ only having been thought repugnant to them, he maintains that we have no reason to suppose that there are in man two substances absolutely distinct from each other. See Disquisitions on Matter and Spirit.

But Dr. Price, in a correspondence with Dr. Priestley, published under the title of A Free Discussion of the Doctrines of Materialism and Philosophical Necessity, 1778, has suggested a variety of unanswerable objections against this hypothesis of the penetrability of matter, and against the conclusions that are drawn from it. The vis inertiæ of matter, he says, is the foundation of all that is demonstrated by natural philosophers concerning the laws of the collision of bodies. This, in particular, is the foundation of Newton's philosophy, and especially of his three laws of motion. Solid matter has the power of acting on other matter by impulse; but unsolid matter cannot act at all by impulse; and this is the only way in which it is capable of acting, by any action that is properly its own. If it be said, that one particle of matter can act upon another without contact and impulse, or that matter can, by its own proper agency, attract or repel other matter which is at a distance from it, then a maxim hitherto universally received must be false, that "nothing can act where it is not." Newton, in his letters to Bentley, calls the notion, that matter possesses an innate power of attraction, or that it can act upon matter at a distance, and attract and repel by its own agency, an absurdity into which he thought no one could possibly fall. And in another place he expressly disclaims the notion of innate gravity, and has taken pains to shew that he did not take it to be an essential property of bodies. By the same kind of reasoning pursued, it must appear, that matter has not the power of attracting and repelling; that this power is the power of some foreign cause, acting upon matter according to stated laws; and consequently that attraction and repulsion, not being actions, much less inherent qualities of matter, as such, it ought not to be defined by them. And if matter has no other property, as Dr. Priestley asserts, than the power of attracting and repelling, it must be a nonentity; because this is a property that cannot belong to it. Besides, all power is the power of something; and yet if matter is nothing but this power, it must be the power of nothing; and the very idea of it is a contradiction. If matter be not solid extension, what can it be more than mere extension?

Farther, matter that is not solid, is the same with pore; and therefore it cannot possess what philosophers mean by the momentum or force of bodies, which is always in proportion to the quantity of matter in bodies, void of pore.

From this disquisition it is obvious to infer that matter is not eternal and uncaused, nor the eternal effect of an eternal cause. We see that matter is a sluggish, inactive lump; not only endued, but utterly incapable of being endued with any active power. Its nature consists in being solidly extended, or so extended as to resist. Resistance is fundamental in its nature; and hence arises an impossibility of its effecting what it resists, viz. any change of its present state. If we should conceive it once placed in any part of the immensity of space (though we could not even conceive it placed at first in that part rather than another without some external cause to determine this particular location): if, we say, we should conceive it once thus placed, we must after that conceive it to remain in that place to all eternity; to continue in that shape or figure, and with the same relative situation of its parts, without any possibility of change or variation, unless we allow of an immaterial cause, which could effect a change in such a dead substance. And in consequence of this it appears that a universal, indesinent, various impulse, from an immaterial cause is necessary to be impressed upon it, to effect all those changes it undergoes, and to produce all those regular and beautiful vicissitudes which we behold in nature, and that the incessant and universal influence of this cause is that which constantly supports the material world. It is also proveable that this inert substance can only resist in proportion to its quantity, and since the least parts make (in fact) the greatest resistance, that they may not be put out of their relative situations among themselves, this itself (that is, cohesive force) must be the power of this immaterial cause, indesinently impressed upon, and exerted in every possible part of matter. And since without this these least parts could not cohere at all, or make a solid resisting substance; it appears that the energy of this cause thus incessantly

put forth through all its possible parts is that which constitutes the solidity and resistance of matter. And hence again it follows that, as the power of this cause constantly exerted, constitutes the nature and solidity of matter now; so it could not have been a solid resisting substance at first, or for any the least time, without the energy of this cause thus exerted. And thus the great question concerning the rise and origin of matter seems to be naturally and easily determined. For it must have been a thing caused at whatever time it may have been brought into existence; since nothing can be more against reason than to suppose that such a dead, inactive, substance (a substance which wants the power of a foreign cause to be indesinently put forth upon it, that it may be what it is), should nevertheless be a thing uncaused and independent. Without this foreign influence to effect cohesion and solidity in it, we could not conceive it at all to be a substance. Let us go as far as we can in the subdivision of parts, so long as we allow those parts to be solid and extended, we must allow them to be solid and extended by this external power exerted: and if they are not solid and extended parts, they cannot be parts of solid and extended substances.

This carries the point beyond the reach of objection: for to say there might have been some incomplete subject or substratum, eternal and self-existent, which the power of this cause (by being exerted in it) constituted into a solid, resisting substance, would be to speak not only unintelligibly but absurdly. What could this incomplete, self-existent thing be? It could not be matter, or solid and resisting substance; but some unsubstantial phantom of matter. And we may demand a reason from the patrons of eternal and uncaused matter, why an incomplete unsubstantial phantom of matter should be eternal and uncaused; since the substance in its complete nature would only be a dependent effect? It cannot be that a half-finished, imperfect thing, should have a better claim to self-existence than that whose nature is full and complete.

But even if the eternity of matter were admitted, the object of those who contend for it would not thereby be gained; for it would not thence follow that the Deity might be excluded, even in thought. The reasoning of the poet Young is decisive on this point; and with it we shall terminate this article.

"Whence earth and these bright orbs?—Eternal?
Grant matter was eternal; still these orbs
Would want some other father:—much design
Is seen in all their motions, all their makes;
Design implies intelligence and art:
That can't be from themselves—or man: That art
Man scarce can comprehend, could man bestow?
And nothing greater yet allow'd than man.—
Who motion, foreign to the smallest grain,
Shot through vast masses of enormous weight?
Who bid brute matter's restive lump assume
Such various forms, and gave it wings to fly?
Has matter innate motion? Then each atom
Asserting its indisputable right
To dance, would form an universe of dust:
Has matter none? Then whence these glorious forms,
And boundless flights, from shapeless and repos'd?
Has matter more than motion? Has it thought,
Judgment and genius? Is it deeply learn'd
In mathematics? Has it fram'd such laws
Which, but to guess, a Newton made immortal?
If so, how each sage atom laughs at me,
Who think a clod inferior to a man!
If art to form; and counsel to conduct;
And that with greater far than human skill,
Resides not in each block; a Godhead reigns."

*To* MA'TTER. *v. n.* (from the noun.) 1. To be of importance; to import (*B. Jonson*). 2. To generate matter by suppuration (*Sidney*).

*To* MA'TTER. *v. a.* To regard; not to neglect (*Bramston*).

MA'TTERY. *a.* (from *matter.*) Purulent; generating matter (*Harvey*).

MATTHEO (St.), a town of Arragon, in Spain, 55 miles N. of Valencia. Lat. 40. 12 N. Lon. 0. 36 W.

MATTHEO (St.), or ST. MATTHEW, an island of the Atlantic ocean, about 420 miles distant from the coast of Africa. The Portuguese planted it, but have since deserted it. Lat. 1. 24 S. Lon. 6. 10 W.

MATTHEW (St.), the son of Alpheus, was also called Levi. He was of Jewish original, as both his names discover, and probably a Galilean. Before his call to the apostolate he was a publican or toll-gatherer to the Romans; an office of bad repute among the Jews, on account of the covetousness and exaction of those who managed it: St. Matthew's office particularly consisting in gathering the customs of all merchandize that came by the sea of Galilee, and the tribute that passengers were to pay who went by water. And here it was that Matthew sat at the receipt of custom when our Saviour called him to be a disciple. It is probable that, living at Capernaum, the place of Christ's usual residence, he might have some knowledge of him before he was called. Matthew immediately expressed his satisfaction in being called to this high dignity, by entertaining our Saviour and his disciples at a great dinner at his own house, whither he invited all his friends, especially those of his own profession, hoping, probably, that they might be influenced by the company and conversation of Christ. St. Matthew continued with the rest of the apostles till after our Lord's ascension. For the first eight years afterwards he preached in Judæa. Then he betook himself to propagating the gospel among the Gentiles, and chose Ethiopia as the scene of his apostolical ministry;

where it is said he suffered martyrdom, but by what kind of death is not known.

MATTHEW THE EVANGELIST'S DAY (St.), a festival of the Christian church, observed on September 21st.

MATTHEW, or GOSPEL OF ST. MATTHEW, a canonical book of the New Testament. St. Matthew wrote his Gospel in Judæa, at the request of those he had converted; and it is thought he began in the year 41, eight years after Christ's resurrection. It was written, according to the testimony of all the ancients, in the Hebrew or Syriac language; but the Greek version, which now passes for the original, is as old as the apostolical times.

The authenticity of the two first chapters of Matthew's Gospel has been called in question, especially by those who disbelieve the miraculous conception of our Lord. On this subject we have the following judicious remarks by Dr. Marsh, in the notes to Michaelis:

"The evidence of the Greek manuscripts is decidedly in favour of the authenticity of the two first chapters of St. Matthew's Gospel. Equally decisive is the testimony of the ancient versions; for these chapters are contained in all of them. That in some few Latin manuscripts the genealogy is separated from the remaining part of the first chapter, and that St. Matthew's Gospel is made to begin with chap. i. 18, is a circumstance which is not only much too trivial to be opposed to the weight of evidence on the other side, but, at the furthest, can affect only the genealogy, and not the whole of the two first chapters. In fact, such writers of Latin manuscripts, as wrote the genealogy apart from the rest of the Gospel, were actuated not by critical, but theological motives. They found difficulty in reconciling the genealogy in Matthew i. with that of Luke iii. and therefore wished to get rid of it. Consequently it is highly uncritical to take their manuscripts even into consideration. With respect to the quotations of ancient writers, which form the third kind of evidence, it is sufficient to observe, that both Clement of Alexandria and Origen have quoted from the two chapters in question, without signifying any suspicion of their want of authenticity. And what is still more, even Celsus, the great enemy of the Christian religion in the second century, has quoted from them. We must set, therefore, all the laws of criticism at defiance, if we assert that the Greek Gospel of St. Matthew, to which alone the preceding arguments relate, began with ch. iii. εν δε ταις ἡμεραις εκειναις. That the Greek gospel ever began in this manner is in itself likewise incredible, since no writer, unless something preceded, would say 'in *those* days.'

"On the other hand, however evident it may be, that the Greek gospel of St. Matthew, from its very first existence, contained the two first chapters, yet, as this gospel is a translation from the Hebrew (that is, Chaldee) of St. Matthew, it is still possible, that they were not contained in the original, that the original began, as Epiphanius says the gospel used by the Ebionites began, with the words, 'it happened in the days of Herod the king, &c.' that the Greek translator prefixed a translation of some other Chaldee document containing an account of Christ's birth, and that, in order to connect it with the commencement of his original, he altered 'the days of Herod' to 'those days.' All this is possible: but it would be a very difficult matter to render it probable. It appears indeed from the Dissertation on the origin of our three first Gospels, ch. xv. that before any of our canonical gospels was composed, there existed an Hebrew (that is, Chaldee) narrative of Christ's transactions, which contained only so much matter as is common to the three first Evangelists, and therefore did not contain what is related in Matth. i. ii. But then it is further shewn in the same chapter, that this document formed only the basis of St. Matthew's gospel, and that the Evangelist himself made very considerable additions and improvements. There is no improbability therefore in the supposition, that the two first chapters were added by the Evangelist himself, especially since the Hebrew gospel used by the Nazarenes really contained them, as appears from notes 10, 11: and there is great reason to believe that the Hebrew gospel used by the Nazarenes approached much nearer to St. Matthew's genuine original than that which was used by the Ebionites, since the Nazarenes were descendants of the first converts to Christianity, the Christians of Judea being called Ναζωραιοι, Acts xxiv. 5. while the Greek Christians were called Χριςιανοι, Acts xi. 26. Absolute certainty on this subject is, indeed, not to be obtained for want of sufficient data: but the same want of data makes it impossible to prove that St. Matthew was not the author of the chapters in question.—Among the various writers on this subject, no one has displayed more critical judgment than professor Rau of Erlangen, in a short Latin dissertation published at Erlangen in 1793, entitled Symbolæ ad quæstionem de authentia i. et ii. cap. Evangelii Matthæi discutiendam."

There is likewise an admirable defence of the authenticity of the first two chapters of Matthew's Gospel in the Quarterly Review, vol. i. p. 320—330, which we regret it is not consistent with our narrow limits to extract.

MATTHEW CANTAUZENUS, son of John emperor of the East, and his associate in the empire in 1354. John abdicated the throne some time after, on which Matthew remained emperor with John Palæologus. These two princes at length disagreed, and had recourse to arms. A battle was fought between them in Thrace, and Matthew being defeated and taken prisoner, was compelled to make a formal renunciation of the throne to his rival.

MATTHEW of Westminster, an English historian of the 14th century. He was a benedictine monk, and left a chronicle in Latin, entitled, Flores Historiarum, per Matthæum Westmonasteriensem collecti, præcipuè de Rebus Britannicis ab exordio Mundi, usque ad ann. 1307, published at London in 1567, and

at Frankfort in 1601, folio. He is remarkable for his strict attention to veracity.

MATTHIAS'S DAY (St.), a festival of the Christian church observed on the 24th of January.—St. Matthias was an apostle of Jesus Christ, who was chosen by lot after the treason and death of Judas Iscariot.

MATTHIOLA. In botany, a genus of the class pentandria, order monogynia; corol tubular, superior, undivided; calyx entire; drupe with a globular nut. One species, an American tree, with scattered ovate leaves; and pinnate bractes.

MA'TTOCK. *s.* (mattuc, Saxon.) 1. A kind of toothed instrument to pull up weeds (*Shakspeare*). 2. A pickaxe (*Brown*).

MA'TTRESS. *s.* (*matras*, French.) A kind of quilt made to lie upon (*Dryden*).

MATTUSCKHŒA. In botany, a genus of the class pentandria, order monogynia. Calyx four-parted; corol funnel-form, four-cleft; seeds four, naked. One species, a hairy plant of Guiana.

MATURANTS, in surgery, applications which promote the suppuration of tumors.

MATURA'TION. *s.* (from *maturo*, Latin.) 1. The state of growing ripe (*Bacon*). 2. The act of ripening (*Bentley*).

MATURATION. (from *maturo*, to make ripe.) A term in surgery, signifying that process which succeeds inflammation, by which pus is collected in an abscess.

MA'TURATIVE. *a.* (from *maturo*, Latin.) 1. Ripening; conducive to ripeness (*Brown*). 2. Conducive to the suppuration of a sore.

MATU'RE. *a.* (*maturus*, Latin.) 1. Ripe; perfected by time (*Prior*). 2. Brought near to a completion (*Shakspeare*). 3. Well-disposed; fit for execution; well digested.

*To* MATU'RE. *v. a.* (*maturo*, Latin.) 1. To ripen; to advance to ripeness (*Bacon*). 2. To advance toward perfection (*Pope*).

MATU'RELY. *ad.* (from *mature*,) 1. Ripely; completely. 2. With counsel well-digested (*Swift*). 3. Early; soon (*Bentley*).

MATU'RITY. *s.* (*maturitas*, Latin.) Ripeness; completion (*Rogers*).

MATY (MATTHEW, M.D.), an eminent physician and polite writer, was born in Holland in 1718. He took his degree of M.D. at Leyden; and in 1740 came to settle in England, his father having determined to quit Holland for ever. In order to make himself known, in 1749 he began to publish in French an account of the productions of the English press, printed at the Hague under the name of the Journal Britannique. This journal, which continues to hold its rank among the best of those which have appeared since the time of Bayle, answered the chief end he intended by it, and introduced him to the acquaintance of some of the most respectable literary characters of the country he had made his own. It was to their active and uninterrupted friendship he owed the places he afterwards possessed. In 1758 he was chosen fellow; and in 1765, on the resignation of Dr. Birch, who died a few months after, and made him his executor, secretary to the Royal Society. He had been appointed one of the under librarians of the British Museum at its first institution in 1753, and became principal librarian at the death of Dr. Knight in 1772. Useful in all these posts, he promised to be eminently so in the last, when he was seized with a languishing disorder, which in 1776 put an end to a life which had been uniformly devoted to the pursuit of science and the offices of humanity. He was an early and active advocate for inoculation; and when there was a doubt entertained that one might have the small-pox this way a second time, he tried it upon himself unknown to his family. He was a member of the medical club (with the Drs. Parsons, Templeman, Fothergill, Watson, and others), which met every fortnight in St. Paul's church-yard. He was twice married, viz. the first time to Mrs. Elizabeth Boisragon, and the second to Mrs. Mary Deners. He left a son and three daughters. He had nearly finished the Memoirs of the earl of Chesterfield, which were completed by his son-in-law Mr. Justamond, and prefixed to that nobleman's Miscellaneous Works, 1777, 2 vols. 4to.

MATY (Paul Henry), M A. F.R.S. son of the former, was educated at Westminster, and Trinity college, Cambridge, and had their travelling fellowship for three years. He was afterwards chaplain to lord Stormont at Paris, in 17 . . , and soon after vacated his next fellowship by marrying one of the three daughters of Joseph Clark, esq. sister of the late captain Charles Clark (who succeeded to the command on the death of captain Cooke). On his father's death in 1776, he succeeded to the office of one of the under librarians of the British Museum, and was afterwards preferred to a superior department, having the care of the antiquities, for which he was eminently well qualified. In 1776 he also succeeded his father in the office of secretary to the Royal Society. On the disputes respecting the reinstatement of Dr. Hutton in the department of secretary for foreign correspondence, 1784, Mr. Maty took a warm and distinguished part, and resigned the office of secretary; after which he undertook to assist gentlemen or ladies in perfecting their knowledge of the Greek, Latin, French, and Italian classics. Mr. Maty was a thinking, conscientious man; and having conceived some doubts about the articles he had subscribed in early life, he never could be prevailed upon to place himself in the way of ecclesiastical preferment, though his connections were amongst those who could have served him essentially in this point; and soon after his father's death he withdrew himself from ministering in the established church, his reasons for which he published in the 47th volume of the Gent. Magazine, p. 466. His whole life was thenceforwards taken up in literary pursuits. He received 100*l.* from the duke of Marlborough, with a copy of that beautiful work the Gemmæ Marlburienses, of which only 100 copies were worked off for presents; and of which Mr. Maty wrote the French account, as Mr. Bryant

did the Latin. In January 1782 he set on foot a Review of Publications, principally foreign, which he carried on, with great credit to himself and satisfaction to the public, for near five years, when he was obliged to discontinue it from ill health. He had long laboured under an asthmatic complaint, which at times made great ravages in his constitution, and at last put a period to his life in January 1787, at the age of 42; leaving behind him one son.—Mr. Maty enjoyed a respectable rank in the republic of letters, and by his talents and attainments was fully entitled to it. He was eminently acquainted with ancient and modern literature, and particularly conversant in critical researches. The purity and probity of his nature were unquestionable; and his humanity was as exquisite as it would have been extensive, had it been seconded by his fortune.

MAUCAUCO, MACACO, or MAKI, in zoology. See LEMUR.

MAUBEUGE, a fortified town of France, in the department of the North, and late province of French Hainault, with a late abbey of noble canonesses. In September 1793 the Austrians formed the blockade of this place, but were driven from their position in the following month. It is seated on the Sambre, 12 miles south of Mons, and 40 south-west of Brussels. Lon. 4. 5 E. Lat. 50. 15 N.

MAUDLIN. In botany, a name given to one or two species of the genus achillea.

MA'UDLIN. *a.* Drunk; fuddled (*Southern*).

MA'UGRE. *ad.* (*malgré*, French.) In spite of; notwithstanding: out of use (*Burnet*).

MA'VIS. *s.* (*mauvis*, French.) A thrush. See TURDUS.

*To* MAUL. *v. a.* (from *malleus*, Latin.) To beat; to bruise; to hurt in a coarse or butcherly manner (*Dryden*).

MAUL. *s.* (*malleus*, Latin.) A heavy hammer: commonly written *mall* (*Proverbs*).

MAULDAH, a city of Hindustan Proper, in Bengal, situate on a river that communicates with the Ganges. It arose out of the ruins of Gour, which are in its neighbourhood; and is a place of trade, particularly in silk, 190 miles N. of Calcutta. Lon. 88. 28 E. Lat. 25. 10 N.

MAULEON, a town of France, in the department of the Lower Pyrenees, situate on the frontiers of Spain, 20 miles SW of Pau, and 40 SE. of Dax. Lon. 0. 31 W. Lat. 43. 10 N.

MAULEON, a town of France, in the department of Vendée, with a late famous Augustine abbey. It is seated near the river Oint, 52 miles NE. of Rochelle, and 52, NW. of Poitiers. Lon. 0. 36 W. Lat 46. 54 N.

MAUNCH, in heraldry, the figure of an ancient coat sleeve, borne in many gentlemen's escutcheons.

MAUND. *s.* (manꝺ, Sax.) A hand-basket.

*To* MA'UNDER. *v. n.* (*maudire*, French.) To grumble; to murmur (*Wiseman*).

MA'UNDERER. *s.* (from *maunder.*) A murmurer; a grumbler.

MAUNDY THURSDAY, is the Thursday in Passion week, which was called Maundy or Mandate Thursday, from the command which our Saviour gave his apostles to commemorate him in the Lord's supper, which he this day instituted; or from the new commandment which he gave them to love one another, after he had washed their feet as a token of his love to them.

MAUPERTUIS (Peter Louis Morceau de), a celebrated French mathematician and philosopher, was born at St. Malo in 1698, and was there privately educated till he attained his 16th year, when he was placed under the celebrated professor of philosophy, M. le Blond, in the college of la Marche, at Paris; while M. Guisnée, of the Academy of Sciences, was his instructor in mathematics. For this science he soon discovered a strong inclination, and particularly for geometry. He likewise practised instrumental music in his early years with great success; but fixed on no profession till he was 20, when he entered into the army; in which he remained about 5 years, during which time he pursued his mathematical studies with great vigour. After that time he devoted himself entirely to science, and in 1723 became a member of the French Academy, and about five years after was chosen a fellow of the Royal Society of London. In 1736 he was sent with other academicians to the North, to determine the figure of the earth, which service they performed with reputation. At the invitation of the prince of Prussia, afterwards Frederic the Great, he went to Berlin, and was appointed president, and director of the academy there. He was of an irritable temper, and had a dispute with Koenig, professor of philosophy at Franeker, and another with Voltaire, who exerted his satirical talents against him. He died at Basil on a visit to the Bernouillis in 1759.

The works which he published were collected into 4 vols. 8vo. published at Lyons, in 1756, where also a new and elegant edition was printed in 1768. These contain the following works: 1. Essay on Cosmology.—2. Discourse on the different Figures of the Stars.—3. Essay on Moral Philosophy.—4. Philosophical Reflections upon the Origin of Languages, and the Signification of Words.—5. Animal Physics, concerning Generation, &c.—6. System of Nature, or the Formation of Bodies.—7. Letters on various subjects.—8. On the Progress of the Sciences.—9. Elements of Geography.—10. Account of the Expedition to the Polar Circle, for determining the Figure of the Earth; or the Measure of the Earth at the Polar Circle. —11. Account of a Journey into the Heart of Lapland, to search for an ancient Monument. —12. On the Comet of 1742.—13. Various Academical Discourses, pronounced in the French and Prussian Academies.—14. Dissertation upon Languages.—15. Agreement of the different Laws of Nature, which have hitherto appeared incompatible.—16. Upon the Laws of Motion.—17. Upon the Laws of Rest.—18. Nautical Astronomy.—19. On the Parallax of the Moon.—20. Operations for determining

the Figure of the Earth, and the Variations of Gravity.—21. Measure of a Degree of the Meridian at the Polar Circle.

Besides these works Maupertuis was author of a great multitude of interesting papers, particularly those printed in the Memoirs of the Paris and Berlin Academies, far too numerous here to mention, viz. in the Memoirs of the Academy at Paris from the year 1724 to 1749, and in those of the Academy of Berlin from the year 1746 to 1756.

MAUR (St.), a disciple of St. Benedict, and abbot of Glauseuil in Anjou. He died about 584. At the beginning of the 17th century was founded a famous congregation of benedictines of St. Maur, which has produced many learned men.

MAURA (St.), an island in the Mediterranean, near the coast of Albania, 15 miles N.E. of the island of Cephalonia. Lon. 20. 46 E. Lat. 39. 2 N.

MAURANDA, in botany, a genus of the class didynamia, order angiospermia. Calyx five-parted; corol campanulate, unequal; filaments callous at the base; capsules two, united, half five-valved at the top. One species; a climbing shrub of Mexico, with nodding violet flowers.

MAURE (St.), a town of France, in the department of Indre and Loire, 17 miles S. of Tours, and 148 S.W. of Paris. Lon. 0. 42 E. Lat. 47. 9 N.

MAUREPAS (John Frederic Philypeaux, count of), a French statesman, was born in 1701, and at the age of 14 appointed secretary at court. In 1728 he became superintendant of the marine, and in 1738 minister of state; but in 1749 he was banished to Bourges, by the intrigues of a lady who was powerful at court. In 1774 he was recalled to the ministry by Louis XVI. who put the greatest confidence in him. He was a man of profound knowledge, and great liberality; but the advice he gave to the king to meddle in the dispute between England and America is a reflection on him. He died in 1781.

MAURICE (St.), a town of Swisserland, in the Vallais, situate on the Rhone, between two high mountains, 16 miles N.W. of Martigny. It guards the entrance into the Lower Vallais.

MAURICEAU (Francis), a French surgeon, who applied himself with great success and reputation to the theory and practice of his art for several years at Paris. Afterwards he confined himself to the disorders of pregnant and lying-in-women, and was at the head of all the operators in this way. His Observations sur la grossesse et sur l'accouchement des femmes, sur leurs maladies, et celles des enfans nouveaux, 1694, in 4to. is reckoned an excellent work, and has been translated into several languages; German, Flemish, Italian, English: and the author himself translated it into Latin. It is illustrated with cuts. He published another piece or two, by way of supplement, on the same subject; and died at Paris in 1709.

MAURITANIA, an ancient kingdom of Africa, bounded on the west by the Atlantic ocean, on the south by Getulia or Libya Interior, and on the north by the Mediterranean, and comprehending the greater part of the kingdoms of Fez and Morocco. Its ancient limits are not exactly mentioned by any historian: neither can they now be ascertained by any modern observations, these kingdoms being but little known to Europeans.

This country was originally inhabited by a people called Mauri, concerning the etymology of which name authors are not agreed. It is probable, however, that this country, or at least a great part of it, was first called Phut, since it appears from Pliny, Ptolemy, and St. Jerom, that a river and territory not far from Mount Atlas went by that name. From the Jerusalem Targum it likewise appears, that part of the Mauri may be deemed the offspring of Lud the son of Misraim, since his descendants, mentioned Genesis x. are there called מורטאי, Mauri, or Mauritani. It is certain, that this region, as well as the others to the eastward of it, had many colonies planted in it by the Phœnicians. Procopius tells us, that in his time two pillars of white stone were to be seen there, with the following inscription, in the Phœnician language and character, upon them: "We are the Canaanites, that fled from Joshua the son of Nun, that notorious robber." Ibnu Rachic, or Ibnu Raquig, an African writer cited by Leo, together with Evagrius and Nicephorus Callistus, assert the same thing.

The Mauritanians, according to Ptolemy, were divided into several cantons or tribes. The Metagonitæ were seated near the straits of Hercules, now those of Gibraltar. The Saccosii, or Cacosii, occupied the coast of the Iberian sea. Under these two petty nations the Masices, Verues, and Verbicæ or Vervicæ, were settled. The Salisæ, or Salinsæ, were situated lower, towards the ocean; and still more to the south the Volubiliani. The Maurensii and Herpiditani possessed the eastern part of this country, which was terminated by the Mulucha. The Angaucani or Jangacaucani, Nectiberes, Zagrensii, Baniubæ, and Vacuntæ, extended themselves from the southern foot of Ptolemy's Atlas Minor to his Atlas Major. Pliny mentions the Baniuræ, whom father Hardouin takes to be Ptolemy's Baniubæ; and Mela the Atlantes, whom he represents as possessed of the western parts of this district.

The earliest prince of Mauritania mentioned in history is Neptune; and next to him were Atlas and Antæus his two sons, both famous in the Grecian fables on account of their wars with Hercules.

MAURITIA. Ginkgo. In botany, a genus of the class diœcia, order hexandria. Male; an oblong, sessile ament; calyx one-leaved, cup-shaped, entire; corol one-petalled, with a short tube and three-parted border; filaments inserted in the throat of the tube. Fem.; unknown. One species; a Surinam tree nearly leafless, with flexuous branches, terminating in clasping sheaths, with a cup-shaped knee-joint. The height is about that of a walnut-tree; bark ash-coloured; wood brittle; pith

soft and fungous. The flowers are in aments, and are succeeded by a fruit somewhat resembling an apricot-stone, but much larger, containing a large kernel of the sweetness of an almond, often eaten at repasts after dinner to promote digestion from its pleasant bitter.

MAURITIUS. See ISLE OF FRANCE.

MAUROLICO (Francis), an Italian mathematician, was born at Messina in 1494. He was abbe of Santa Maria del Porto in Sicily, and taught mathematics with great reputation. He died in 1575. His works are, 1. An edition of the Spherics of Theodosius. 2. Emendatio et restitutio Conicorum Apollonii Pergæi. 3. Archimedis Monumenta omnia. 4. Euclidis Phænomena, &c.

MAUVUA, one of the Society islands, in the South Pacific Ocean, surrounded by a reef of rocks, without a harbour. Lon. 152. 35 W. Lat. 16. 26 S.

MAUSOLEUM, a magnificent tomb, or funeral monument. The word is derived from Mausolus, king of Caria, to whom Artemisia, his widow, erected a most stately monument, esteemed one of the wonders of the world, and called it, from his name, Mausoleum.

MAW. *s.* (maʒa, Saxon.) 1. The stomach of animals (*Sidney*). 2. The craw of birds (*Arbuthnot*).

MAW-SEED, in botany. See PAPAVER.

MAWES (St.), a town in the county of Cornwall, seated on the east side of Falmouth haven, in lon. 5. 26 W. lat. 50. 30 N. Though but a hamlet of the parish of St. Just, two miles off, without a minister, or either church, chapel, or meeting-house, it has sent members to parliament ever since 1562, who are returned by its mayor or portreve. It consists but of one street, under a hill, and fronting the sea, and its inhabitants subsist purely by fishing. King Henry VIII. built a castle here, over against Pendennis, for the better security of Falmouth haven. It has a governor, a deputy, and two gunners, with a platform of guns. Here is a fair the Friday after St. Luke's day.

MA'WKISH. *a.* (perhaps from *maw.*) Apt to give satiety; apt to cause loathing (*Pope*).

MA'WKISHNESS. *s.* (from *mawkish.*) Aptness to cause loathing.

MA'WMET. *s.* (or *mammet*; from *mam* or *mother.*) A puppet, anciently an idol.

MA'WMISH. *a.* (from *maw* or *mawmet.*) Foolish; idle; nauseous (*L'Estrange*).

MAXENTIUS (Marcus Aurelius Valerius), Roman emperor, was the son of Maximianus Hercules, and declared himself Augustus in 306. He was opposed by Galerius Maximianus, who was defeated, and slew himself. Maxentius then marched into Africa, where he became odious by his cruelties. Constantine afterwards defeated him in Italy, and he was drowned in crossing the Tiber in 312.

MAXILLA. (*maxilla*, from *μασσαω*, to chew.) In anatomy, the jaw.

MAXILLA INFERIOR. Os maxillare inferius. Mandibula. The maxilla inferior, or lower jaw, which, in its figure, may be compared to a horse-shoe, is at first composed of two distinct bones; but these, soon after birth, unite together at the middle of the chin, so as to form only one bone. The superior edge of this bone has, like the upper jaw, a process, called the alveolar process. This, as well as that of the upper jaw, to which it is in other respects a good deal similar, is likewise furnished with cavities for the reception of the teeth. The posterior part of the bone on each side rises perpendicularly into two processes, one of which is called the coronoid, and the other the condyloid process. The first of these is the highest: it is thin and pointed; and the temporal muscle, which is attached to it, serves to elevate the jaw. The condyloid process is narrower, thicker, and shorter than the other, terminating in an oblong, rounded head, which is formed for a moveable articulation with the cranium, and is received into the fore part of the fossa described in the temporal bone. In this joint there is a moveable cartilage, which being more closely connected to the condyle than to the cavity, may be considered as belonging to the former. This moveable cartilage is connected with both the articulating surface of the temporal bone and the condyle of the jaw, by distinct ligaments arising from its edges all round. These attachments of the cartilage are strengthened, and the whole articulation secured, by an external ligament, which is common to both, and which is fixed to the temporal bone, and to the neck of the condyle. On the inner surface of the ligament, which attaches the cartilage to the temporal bone, and backwards in the cavity, is placed what is commonly called the gland of the joint; at least the ligament is there found to be much more vascular than at any other part. At the bottom of each coronoid process, on its inner part is a foramen or canal, which extends under the roots of all the teeth, and terminates at the outer surface of the bone near the chin. Each of these foramina affords a passage to an artery, vein, and nerve, which send off branches to the several teeth.

This bone is capable of many motions. The condyles, by sliding from the cavity towards the eminences on each side, bring the jaw horizontally forwards, as in the action of biting; or the condyles only may be brought forwards, while the rest of the jaw is tilted backwards, as is the case when the mouth is open. The condyles may also slide alternately backwards and forwards from the cavity to the eminence, and vice versa; so that while one condyle advances, the other moves backwards, turning the body of the jaw from side to side, as in grinding the teeth. The great use of the cartilages seems to be that of securing the articulation, by adapting themselves to the different inequalities in these several motions of the jaw, and to prevent any injuries from friction. This last circumstance is of great importance where there is so much motion, and accordingly this cartilage is found in the different tribes of carnivorous animals where there is no eminence and cavity, nor other apparatus for grinding.

The aveolar processes are formed of an external and internal plate, united together by thin bony partitions, which divide the processes at the fore part of the jaw into as many sockets as there are teeth. But at the posterior part, where the teeth have more than one root, each root has a distinct cell. These processes in both jaws begin to be formed with the teeth, accompany them in their growth, and disappear when the teeth fall. So that the loss of the one seems constantly to be attended with the loss of the other.

Maxilla superior. Os maxillare superius. The superior maxillary bones constitute the most considerable portion of the upper jaw, are two in number, and generally remain distinct through life. Their figure is exceedingly irregular, and not easily to be described. On each of these bones is observed several eminences. One of these is at the upper and fore part of the bone, and, from its making part of the nose, is called the nasal process. Internally, in the inferior portion of this process, is a fossa, which, with the os unguis, forms a passage for the lachrymal duct. Into this nasal process likewise is inserted the short round tendon of the masculus orbicularis palpebrarum. Backwards and outwards, from the root of the nasal process, the bone helps to form the lower side of the orbit, and this part is therefore called the orbitar process. Behind this orbitar process the bone forms a considerable tuberosity, and at the upper part of this tuberosity is a channel, which is almost a complete hole. In this channel passes a branch of the fifth pair of nerves, which, together with a small artery, is transmitted to the face through the external orbitar foramen, which opens immediately under the orbit. Where the bone on each side is joined to the os malæ, and helps to form the cheeks, is observed what is called the malar process. The lower and anterior parts of the bone make a kind of circular sweep, in which are the alveoli or sockets for the teeth; this is called the alveolar process. This alveolar process has posteriorly a considerable tuberosity on its internal surface. Above this alveolar process, and just behind the fore teeth, is an irregular hole, called the foramen incisivum, which separating into two, and sometimes more holes, serves to transmit small arteries and veins, and a minute branch of the fifth pair of nerves to the nostrils. There are two horizontal lamellæ behind the alveolar process, which, uniting together, form part of the roof of the mouth, and divide it from the nose. This partition being seated somewhat higher than the lower edge of the alveolar process, gives the roof of the mouth a considerable hollowness. Where the ossa maxillaria are united to each other they project somewhat forwards, leaving between them a furrow, which receives the inferior portion of the septum nasi. Each of these bones is hollow, and forms a considerable sinus under its orbitar part. The sinus, which is usually, though improperly, called antrum Highmorianum, is lined with the pituitary membrane. It answers the same purposes as the other sinuses of the nose, and communicates with the nostrils by an opening, which appears to be a large one in the skeleton, but which in the recent subject is much smaller. In the fœtus, instead of these sinuses, an oblong depression only is observed at each side of the nostrils, nor is the tuberosity of the alveolar process then formed. On the side of the palate in young subjects a kind of fissure may be noticed, which seems to separate the portion of the bone which contains the dentes incisores from that which contains the dentes canini. This fissure is sometimes apparent till the sixth year, but after that period it in general wholly disappears.

The ossa maxillaria not only serve to form the cheeks, but likewise the palate, nose, and orbits; and, besides their union with each other, they are connected with the greatest part of the bones of the face and cranium, viz. with the ossa nasi, ossa malarum, ossa unguis, ossa palati, os frontis, os sphenoides, and os ethmoides.

MAXILLARY ARTERIES, in anatomy. These are branches of the external carotid. The external maxillary is the fourth branch of the carotid; it proceeds anteriorly, and gives off the facial or mental, the coronary of the lips, and the angular artery. The internal maxillary is the next branch of the carotid; it gives off the sphæno-maxillar, the inferior alveolar, and the spinous artery.

Maxillary glands. The glands so called are conglomerate, and situated under the angles of the lower jaw. The inexcretory ducts are called Warthonian, after their discoverer.

Maxillary nerves. The superior and inferior maxillary nerves are branches of the fifth pair of trigemini. The former is divided into the sphæno-palatine, posterior alveolar, and the infra-orbital nerve. The latter is divided into two branches, the internal lingual, and one more properly called the inferior maxillary.

MA'XIM. *s.* (*maximum*, Lat.) An axiom; a general principle; a leading truth. See Axiom.

MAXIMA. (Latin.) The longest note formerly used in music, being equal to two longs, four breves, eight semibreves, &c. See the word Large.

MAXIMILIAN I. archduke of Austria, was the son of Frederic IV. created king of the Romans in 1486, and elected emperor on the death of his father in 1493. He had several wars with France, which were mostly successful. He formed the design of making himself pope, and actually endeavoured to prevail on Julius II. to admit him as coadjutor. He was, however, a man of science, and wrote Memoirs of his own life, and some poems. He died in 1519.

Maximilian II. emperor of Germany, was the son of the emperor Ferdinand I. and elected king of the Romans in 1562. He was chosen king of Hungary and Bohemia, and succeeded his father in 1564. He died at Ratisbon in 1576, aged 50.

MAXIMIANUS (Herculius Marcus Au-

relius Valerius), a native of Sirmium, in Pannonia, served as a common soldier in the Roman armies, and was raised as colleague to the imperial throne by Diocletian. Maximianus shewed the justness of the choice of Diocletian by his victories over the barbarians. Soon after Diocletian abdicated the imperial purple, and obliged Maximianus to follow his example, but, before the first year of his resignation had elapsed, he re-assumed the imperial dignity, and shewed his ingratitude to his son, by wishing him to resign the sovereignty, and to sink into a private person. Maximianus, after this, acted with the greatest perfidy to his son Maxentius and to Constantine, in Gaul, and was at last left to choose the manner of his own death by Constantine. He strangled himself at Marseilles, A.D. 310, in the 60th year of his age.—2. Galerius Valerius, a native of Dacia, who, in the first years of his life, was employed in keeping his father's flocks. He entered the army, where his valour and bodily strength recommended him to the notice of his superiors, and particularly to Diocletian, who invested him with the imperial purple in the East, and gave him his daughter Valeria in marriage. He conquered the Goths, the Dalmatians, and checked the insolence of the Persians. In a battle, however, with the king of Persia, Galerius was defeated, and, to complete his ignominy, Diocletian obliged him to walk behind his chariot arrayed in his imperial robes. He afterwards wiped away this disgrace by gaining a complete victory over the Persians. He was, as soon as Diocletian had abdicated, proclaimed Augustus, A.D. 304, but his cruelty soon rendered him odious, and the Roman people, offended at his oppression, raised Maxentius to the imperial dignity the following year. He died in the greatest agonies, A.D. 311.

MAXIMINUS (Caius Julius Verus), the son of a peasant of Thrace. He was originally a shepherd, and entered the Roman armies, where he gradually rose to the first offices. On the death of Alexander Severus he caused himself to be proclaimed emperor, A.D. 235. The popularity which he had gained when general of the armies was at an end when he ascended the throne. He was delighted with acts of the greatest barbarity, and no less than 400 persons lost their lives on the false suspicion of having conspired against the emperor's life. They died in the greatest torments; some were exposed to wild beasts, some were nailed on crosses, while others were shut up in the bellies of animals just killed. The noblest of the Romans were the objects of his cruelty. Such is the character of the suspicious and tyrannical Maximinus. In his military capacity he acted with the same ferocity, and, in an expedition in Germany, he not only cut down the corn, but he totally ruined and set fire to the whole country, to the extent of 450 miles. He was at length assassinated by his soldiers in his tent, before the walls of Aquileia, A.D. 236, in the 65th year of his age. The news of his death was received with the greatest rejoicings at Rome, public thanksgivings were offered, and whole hecatombs flamed on the altars. Maximinus has been represented of gigantic size and strength. He generally eat forty pounds of flesh every day, and drank 18 bottles of wine; he could alone draw a loaded waggon, and often broke the hardest stones between his fingers, and cleft trees with his hands. (*Herodianus.*) Maximinus made his son of the same name emperor as soon as he was invested with the purple, and his choice was unanimously approved by the senate, by the people, and by the army.

MAXIMUM, denotes the greatest state or quantity attainable in any given case, or the greatest value of a variable quantity. By which it stands opposed to minimum, which is the least possible quantity in any case.

As in the algebraical expression $a^2-bx$, where $a$ and $b$ are constant or invariable quantities, and $x$ a variable one. Now it is evident that the value of this remainder or difference, $a^2-bx$, will increase as the term $bx$, or $x$, decreases; and therefore that will be the greatest when this is the smallest; that is, $a^2-bx$ is a maximum, when $x$ is the least, or nothing at all.

Again, the expression or difference $a^2-\frac{b}{x}$, evidently increases as the fraction $\frac{b}{x}$ diminishes; and this diminishes as $x$ increases; therefore the given expression will be the greatest, or a maximum, when $x$ is the greatest or infinite.

Also, if along the diameter of a circle, a perpendicular ordinate be conceived to move, it is evident that it increases continually till it arrive at the centre, where it is at the greatest state; and from thence it continually decreases again, as it moves along, and quite vanishes at the other extremity of the diameter. So that the maximum state of the ordinate is equal to the radius of the circle.

*Methodus de maximis et minimis*, a method of finding the greatest or least state or value of a variable quantity.

Some quantities continually increase, and so have no maximum but what is infinite; as the ordinates of the parabola. Some continually decrease, and so their least or minimum state is nothing; as the ordinates to the asymptotes of the hyperbola. Others increase to a certain magnitude, which is their maximum, and then decrease again; as the ordinates of the circle. And others again decrease to a certain magnitude, which is their minimum, and then increase again; while others admit of several maxima and minima.

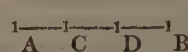
The first maxima and minima are found in the Elements of Euclid, or flow immediately from them: thus, it appears by the 5th prop. of book 2, that the greatest rectangle that can be made of the two parts of a given line, any how divided, is when the line is divided equally in the middle; prob. 7, book 3, shews that the greatest line that can be drawn from a given point within a circle, is that which passes

through the centre; and that the least line that can be so drawn is the continuation of the same to the other side of the circle: prop. 8 ib. shews the same for lines drawn from a point without the circle: and thus other instances might be pointed out in the Elements.—Other writers on the maxima and minima are, Apollonius, in the whole 5th book of his conic sections; and in the preface or dedication to that book, he says others had then also treated the subject, though in a slighter manner.—Archimedes; as in prop. 9, of his Treatise on the Sphere and Cylinder, where he demonstrates that, of all spherical segments under equal superficies, the hemisphere is the greatest.—Serenus, in his 2d book, or that on the Conic Sections.—Pappus, in many parts of his Mathematical Collections; as in lib. 3, prop. 28, &c. lib. 6, prop. 31, &c. where he treats of some curious cases of variable geometrical quantities, shewing how some increase and decrease both ways to infinity; while others proceed only one way, by increase or decrease, to infinity, and the other way to a certain magnitude; and others again both ways to a certain magnitude, giving a maximum and minimum; also lib. 7, prop. 13, 14, 165, 166, &c. And all these are the geometrical maxima and minima of the ancients; to which may be added some others of the same kind, viz. Viviani De Maximis et Minimis Geometrica Divinatio in quintum Conicorum Apollonii Pergæi, in fol. at Flor. 1659; also an ingenious little tract in Thomas Simpson's Geometry, on the Maxima et Minima of Geometrical Quantities, and a nearly similar one in Legendre's Geometry. The subject has likewise been considered geometrically by Lhuillier, by Dr. Horsley in vol. 75 of the Phil. Transac. and by Dr. Gregory in the 3d vol. of Dr. Hutton's Course of Mathematics.

Other writings on the maxima and minima are chiefly treated in a more general way by the modern analysis; and first among these perhaps may be placed that of Fermat. This, and other methods, are best referred to, and explained by the ordinates of curves. For when the ordinate of a curve increases to a certain magnitude, where it is greatest, and afterwards decreases again, it is evident that two ordinates on the contrary sides of the greatest ordinate may be equal to each other; and the ordinates decrease to a certain point, where they are at the least, and afterwards increase again; there may also be two equal ordinates, one on each side of the least ordinate. Hence then an equal ordinate corresponds to two different abscisses, or for every value of an ordinate there are two valves of abscisses. Now as the difference between the two abscisses is conceived to become less and less, it is evident that the two equal ordinates, corresponding to them, approach nearer and nearer together; and when the differences of the abscisses are infinitely little, or nothing, then the equal ordinates unite in one, which is either the maximum or minimum. The method hence derived then, is this: Find two values of an ordinate, expressed in terms of the abscisses: put those two values equal to each other, cancelling the parts that are common to both, and dividing all the remaining terms by the difference between the abscisses, which will be a common factor in them: next, supposing the abscisses to become equal, that the equal ordinates may concur in the maximum or minimum, that difference will vanish, as well as all the terms of the equation that include it; and therefore, striking those terms out of the equation, the remaining terms will give the value of the absciss corresponding to the maximum or minimum.

For example, suppose it were required to find the greatest ordinate in a circle KMQ. Pl. 103. fig. 1. Put the diameter KZ$=a$, the absciss KL$=x$, the ordinate LM$=y$; hence the other part of the diameter is LZ$=a-x$, and consequently, by the nature of the circle KL × LZ being equal LM², $x \times \overline{a-x}$ or $ax - x^2 = y^2$. Again, put another absciss KP$=x+d$, where $d$ is the difference LP, the ordinate PQ being equal to LM or $y$; here then again KP × PZ$=$PQ², or $(x+d) \times (a-x-d) = ax - x^2 - 2dx + ad - d^2 = y^2$; put now these two values of $y^2$ equal to each other, so shall $ax - x^2 = ax - x^2 - 2dx + ad - d^2$; cancel the common terms $ax$ and $x^2$, then $0 = -2dx + ad - d^2$, or $2dx + d^2 = ad$; divide all by $d$, so shall $2x + d = a$, a general equation derived from the equality of the two ordinates. Now, bringing the two equal ordinates together, or making the two abscisses equal, their difference $d$ vanishes, and the last equation becomes barely $2x = a$, or $x = \frac{1}{2}a$, = KN, the value of the absciss KN when the ordinate NO is a maximum, viz. the greatest ordinate bisects the diameter. And the operation and conclusion it is evident will be the same, to divide a given line into two parts, so that their rectangle shall be the greatest possible.

For a second example, let it be required to divide the given line AB into two such parts, that the one line drawn into the square of the other may be the greatest possible.




Putting the given line AB$=a$, and one part AC$=x$; then the other part CB will be $a-x$, and therefore $x^2 \times \overline{a-x} = ax^2 - x^3$ is the product of one part by the square of the other. Again, let one part be AD$=x+d$, then the other part is $a-x-d$, and $(x+d)^2 \times (a-x-d) = ax^2 - x^3 - 3dx^2 + (2ad - 3d^2) . x + ad^2 - d^3$. Then, putting these two products equal to each other, cancelling the common terms $ax^2 - x^3$, and dividing the remainder by $d$, there results $0 = -3x^2 + (2a - 3d) . x + ad - d^2$; hence, cancelling all the terms that contain $d$, there remains $0 = -3x^2 + 2ax$, or $3x = 2a$, and $x = \frac{2}{3}a$; that is, the given line must be divided into two parts in the ratio of 3 to 2. See Fermat's Opera Varia, pa. 63, and his Letters to F. Mersenne.

The next method was that of John Hudde, given by Schooten among the additions to Des Cartes's Geometry, near the end of the 1st vol. of his edition. This method is also drawn from the property of an equation that has two

equal roots. He there demonstrates that, having ranged the terms of an equation, that has two roots equal, according to the order of the exponents of the unknown quantity, taking all the terms over to one side, and so making them equal to nothing on the other side; if then the terms in that order be multiplied by the terms of any arithmetical progression, the resulting equation will still have one of its roots equal to one of the two equal roots of the former equation. Now since, by what has been said of the foregoing method, when the ordinate of a curve, admitting of a maximum or minimum, is expressed in terms of the abscissa, that abscissa, or the value of $x$, will be twofold, because there are two ordinates of the same value; that is, the equation has at least two unequal roots or values of $x$: but when the ordinate becomes a maximum or minimum, the two abscisses unite in one, and the two roots, or values of $x$, are equal; therefore, from the above said property, the terms of this equation for the maximum or minimum being multiplied by the terms of any arithmetical progression, the root of the resulting equation will be one of the said equal roots, or the value of the absciss $x$ when the ordinate is a maximum.

Although the terms of any arithmetic progression may be used for this purpose, some are more convenient than others; and Mr. Hudde directs to make use of that progression which is formed by the exponents of $x$, viz. to multiply each term by the exponent of its power, and putting all the resulting products equal to nothing; which, it is evident, is exactly the same process as taking the fluxions of all the terms, and putting them equal to nothing; being the common process now used for the same purpose.

Thus, in the former of the two foregoing examples, where $ax - x^2$, or $y^2$, is to be a maximum; mult. by 1 2
gives - - $ax - 2x^2 = 0$; hence $2x = a$, and $x = \frac{1}{2}a$, as before.

And in the 2d example, where $ax^2 - x^3$, is to be a maximum; mult. by - - 2 3
gives - - - - - $2ax^2 - 3x^3 = 0$; hence $2a - 3x = 0$, or $3x = 2a$, and $x = \frac{2}{3}a$, as before.

The next general method, and which is now usually practised, is that of Newton, or the method of Fluxions, which proceeds upon a principle different from that of the two former methods of Fermat and Hudde. These proceed upon the idea of the two equal ordinates of a curve uniting into one, at the place of the maximum and minimum; but Newton's upon the principle, that the fluxion or increment of an ordinate is nothing, at the point of the maximum or minimum; a circumstance which immediately follows from the nature of that doctrine: for, since a quantity ceases to increase at the maximum, and to decrease at the minimum, at those points it neither increases nor decreases; and since the fluxion of a quantity is proportional to its increase or decrease, therefore the fluxion is nothing at the maximum or minimum. Hence this rule: Take the fluxion of the algebraical expression denoting the maximum or minimum, and put it equal to nothing; and that equation will determine the value of the unknown letter or quantity in question.

So in the first of the two foregoing examples, where it is required to determine $x$ when $ax - x^2$ is a maximum: the fluxion of this is $a\dot{x} - 2x\dot{x} = 0$; divide by $\dot{x}$, so shall $a - 2x = 0$, or $a = 2x$, and $x = \frac{1}{2}a$.

Also, in the 2d example, where $ax^2 - x^3$ must be a maximum; here the fluxion is $2ax\dot{x} - 3x^2\dot{x} = 0$; hence $2a - 3x = 0$, or $2a = 3x$, and $x = \frac{2}{3}a$.

When a quantity becomes a maximum or minimum, and is expressed by two or more affirmative and negative terms, in which only one variable letter is contained; it is evident that the fluxion of the affirmative terms will be equal to the fluxion of the negative ones; since their difference is equal to nothing.

And when, in the expression for the fluxion of a maximum or minimum, there are two or more fluxionary letters, each contained in both affirmative and negative terms; the sum of the terms containing the fluxion of each letter will be equal to nothing: for, in order that any expression be a maximum or minimum, which contains two or more valuable quantities, it must produce a maximum or minimum, if but one of those quantities be supposed variable. So if $ax - 2xy + by$ denote a minimum; its fluxion is $a\dot{x} - 2y\dot{x} - 2x\dot{y} + b\dot{y}$; hence $a\dot{x} - 2y\dot{x} = 0$, and $b\dot{y} - 2x\dot{y} = 0$; from the former of these $y = \frac{1}{2}a$, and from the latter $x = \frac{1}{2}b$. Or, in such a case, take the fluxion of the whole expression, supposing only one quantity variable; then take the fluxion again, supposing another quantity only variable: and so on, for all the several variable quantities; which will give the same number of equations for determining those quantities. So, in the above example, $ax - 2xy + by$, the fluxion is $a\dot{x} - 2y\dot{x} = 0$, supposing only $x$ variable; which gives $y = \frac{1}{2}a$: and the fluxion is $-2x\dot{y} + b\dot{y} = 0$, when $y$ only is variable; which gives $x = \frac{1}{2}b$; the same as before.

Farther, when any quantity is a maximum or minimum, all the powers or roots of it will be so too; as will also the result be, when it is increased or decreased, or multiplied, or divided by a given or constant quantity; and the logarithm of the same will be also a maximum or minimum.

*To find whether a proposed algebraic quantity admits of a maximum or minimum.*—Every algebraic expression does not admit of a maximum or minimum, properly so called; for it may either increase continually to infinity, or decrease continually to nothing; in both which cases there is neither a proper maximum nor minimum; for the true maximum is that value to which an expression increases, and after which it decreases again; and the minimum is that value to which the expression decreases, and after that it increases again.

Therefore when the expression admits of a maximum, its fluxion is positive before that point, and negative after it: but when it admits of a minimum, its fluxion is negative before, and positive after it. Hence, take the fluxion of the expression a little before the fluxion is equal to nothing, and a little after it; if the first fluxion be positive, and the last negative, the middle state is a maximum; but if the first fluxion be negative, and the last positive, the middle state is a minimum. See Maclaurin's Fluxions, book 1, chap. 9, and book 2, chap. 5, art. 859. (*Hutton's Math. Dict.*)

To distinguish whether a quantity is a maximum or a minimum, or both, we may, supposing that $a$ shews the value of $x$ corresponding to the max. or min. substitute in the quantity proposed instead of $x$, $a+q$, and $a-q$, successively. If the two extreme results are real and smaller than that of the mean, the quantity is a max.: if, on the contrary, the extreme results are larger than the mean one, the quantity is a min.: but if one of the extreme results be imaginary and the other real, the quantity is at the same time a max. and a min., as in the case of QR which is a max. with regard to the branch PNR, and a min. with respect to PMR, Pl. 103. fig. 2. See farther Bossut, Calcul. tom. i. pa. 207; Lacroix, Calcul. Differentiel, pa. 25; Montucla, Histoire des Mathem. tom. iii. pa. 120.

MAXIMUS (Magnus), a native of Spain, who proclaimed himself emperor, A. D. 383. The unpopularity of Gratian favoured his usurpation, and he was acknowledged by his troops. After having defeated Gratian, he demanded of the emperor Theodosius to take him associate on the throne, but Maximus was betrayed by his soldiers, at Aquileia, to the emperor Theodosius, and the conqueror, moved with compassion at the sight of his fallen and dejected enemy, granted him life; but the multitude refused him mercy, and instantly struck off his head, A. D. 388. His son Victor, who shared the imperial dignity with him, was soon after sacrificed to the fury of the soldiers.—2. Petronius, a Roman, descended of an illustrious family. He caused Valentinian III. to be assassinated, and ascended the throne. He was, after a reign of 77 days, stoned to death by his soldiers, and his body thrown into the Tyber, A.D. 455.—3. A celebrated cynic philosopher and magician of Ephesus. He instructed the emperor Julian in magic, and, according to the opinion of some historians, it was in the conversation and company of Maximus that the apostacy of Julian originated. After the death of Julian, Maximus was almost sacrificed to the fury of the soldiers, but the interposition of his friends saved his life, and he retired to Constantinople. He was soon after accused of magical practices before the emperor Valeus, and beheaded at Ephesus, A.D. 366.

Maximus (St.), an abbot and confessor of the 7th century, was of a noble family of Constantinople, and distinguished himself by his zeal against the Monothelites, for which he was thrown into prison, and died there on the 13th of August 1662. He wrote a Commentary on the books attributed to Dionysius the Areopagite, and several other works, of which an edition has been published by father Combesis.

MAY, the fifth month in the year, reckoning from our first, or January; and the third, counting the year to begin with March, as the Romans anciently did. It was called Maius by Romulus, in respect to the senators and nobles of his city, who were named *majores*; as the following month was called Junius, in honour of the youth of Rome, *in honorem juniorum*, who served him in the war; though some will have it to have been thus called from Maia, the mother of Mercury, to whom they offered sacrifice on the first day of it; and Papias derives it from *Madius, eo quod tunc terra madeat*. In this month the sun enters Gemini, and the plants of the earth in general begin to flower.—The month of May has ever been esteemed favourable to love; and yet the ancients, as well as many of the moderns, look on it as an unhappy month for marriage.

May, auxiliary verb; preterit *might*. (magan, Saxon.) 1. To be at liberty; to be permitted; to be allowed: as, *you* may *do for me all you can* (*Locke*). 2. To be possible: *the ditch* may *be filled by labour* (*Bacon*). 3. To be by chance: *a blind man* may *catch a hare* (*Shakspeare*). 4. To have power: *the king* may *pardon treason* (*Shakspeare*). 5. A word expressing desire: may *my friend live long* (*Dryden*).

May be. Perhaps (*Spenser*).

May, in botany. See Mespelus.

May-apple. See Podophyllum.

May-bush. See Mespilus.

May-weed. See Cotula.

May-lily. See Convallaria.

May-dube. See Prunus.

May-fly, in entomology. See Ephemera.

May, a small island of Scotland, at the mouth of the Frith of Forth, with a lighthouse, seven miles S.E. of Cruil. The surrounding rocks render it almost inaccessible.

May-game. *s.* Diversion; sport; such as are used on the first of May (*Bacon*).

May-pole. *s.* Pole to be danced round in May (*Pope*).

MAYER (Tobias), in biography, a very able German astronomer and mechanic in the eighteenth century, was born at Marspach, in the duchy of Wirtemberg, in the year 1723. His father was an ingenious civil-engineer, who particularly excelled in hydraulics; and young Tobias, who was fond of observing him while at work, displayed an early inquisitiveness concerning such ingenious pursuits, and from the age of four years began to design machines with the greatest dexterity and justness. The death of his father, however, whom he lost when very young, probably prevented him from being educated to that employment. Possessing but scanty means for obtaining as-

sistance in his studies, he was obliged to rely on his own energies, by which he made himself a proficient in mathematical learning, and became qualified to be an able instructor of others. While thus occupied, he also assiduously cultivated an acquaintance with classical and polite literature, and learned to write the Latin language with elegance. So well established was his reputation when he had attained to his eight-and-twentieth year, that the university of Gottingen nominated him to the chair of mathematical professor; and not long afterwards he was admitted a member of the Royal Society in that town. From this time, every year of his short, but glorious life, was distinguished by some considerable discoveries in geometry or astronomy. He invented several useful instruments for the more commodious and exact measurement of angles on a plane. He corrected many errors in practical geometry, tracing them to their origin, in the refractions occasioned by terrestrial objects. Afterwards he particularly applied himself to study the theory of the moon, its appearances, the question of its atmosphere, and the reciprocal actions of the sun, earth, and moon upon each other. He then extended his observations to the planet Mars, and the fixed stars; determining with greater exactness than before the places of the latter, and ascertaining that, though commonly denominated fixed, they possess a certain degree of motion relative to their respective systems. Towards the end of his life the magnetic needle engaged his attention, to which he assigned more certain laws than those before received. To these various enquiries and observations he applied with such indefatigable assiduity, that he died exhausted and worn out by his labours in 1762, when only 39 years of age. His table of refractions, deduced from his astronomical observations, agrees very nicely with that of Dr. Bradley; and his theory of the moon, and astronomical tables and precepts, were so well received, that they were rewarded by the English Board of Longitude with the premium of 3,000l. which sum was paid to his widow after his decease. These tables and precepts were published by the board in the year 1770. The principal works which he gave himself to the public were, A New and General Method of resolving all Geometrical Problems, by means of Geometrical Lines, 1741, 8vo. in German. A Mathematical Atlas, in which all the Mathematical Sciences are comprised in sixty Tables, 1748, folio, in German. A Description of a Lunar Globe, constructed by the Cosmographical Society of Nuremberg, from new Observations, 1750, 4to. also in German. Several exact Maps; and some valuable papers in the Memoirs of the Royal Society of Gottingen.

MAYNOOTH, a post-town in the county of Kildare, Ireland, nearly 12 miles from Dublin. This is but a small town, and is principally celebrated for the chartered school or college for Roman-Catholics, opened there 27th of July 1759.

MAYO, one of the Cape de Verd Islands, in the Atlantic Ocean, about 17 miles in circumference. Here is corn, yams, potatoes, and plantains. Its chief commodity is salt; and ships trading to the East Indies frequently take in that article at this place. The inhabitants are negroes, who speak the Portuguese language. Lon. 23. 0 W. Lat. 15. 10 N.

MAYO, a county of Connaught, in Ireland, about 62 miles long, and 52 broad. It has the sea upon the W. and N. Galway on the S. and S.E. Roscommon on the E. and Sligo on the N.E. It is a fertile country, having vast quantities of cattle, deer, hawks and honey. The county sends two knights to parliament; and Castlebar, the only borough town in it, sends two more. A great number of Protestants were massacred here in 1641.

MAYO, once the capital town of the above county; but its principal trade is removed to Killala. Lon. 9. 39 W. Lat. 53. 40 N.

MAYOR, or MAIOR, the chief magistrate or governor in the cities, and most corporation-towns of England; chosen annually by his peers out of the number of the alderman. See ALDERMAN.

The word, according to Verstegan, comes from the ancient English *maier*, able, potent, of the verb *may*, or *can*. The mayor of the place is the king's lieutenant, and, with the aldermen and common council, can make laws, called by-laws, for the government of the place. He has also the authority of a kind of judge, to determine matters, and to mitigate the rigour of the law.

King Richard I. A. D. 1189, first changed the bailiffs of London into mayors; by whose example others were afterwards appointed.

Mayors of corporations are justices of peace, *pro tempore*, and they are mentioned in several statutes; but no person shall bear any office of magistracy concerning the government of any town, corporation, &c. that hath not received the sacrament, according to the church of England, within one year before his election; and who shall not take the oaths of supremacy, &c. Stat. 13 Car. II. cap. 1.

MAYOR'S COURTS. To the lord mayor and city of London belong several courts of judicature. The highest and most ancient is that called the hustings, destined to secure the laws, rights, franchises, and customs of the city. The second is a court of request, or of consience; of which before. The third is the court of the lord mayor and aldermen, where also the sheriffs sit: to which may be added two courts of sheriffs and the court of the city orphans, whereof the lord mayor and aldermen have the custody. Also the court of common council, which is a court or assembly, wherein are made all by-laws which bind the citizens of London. It consists, like the parliament, of two houses: an upper, consisting of the lord mayor and aldermen; and a lower, of a number of common council men, chosen by

the several wards as representatives of the body of the citizens. In the court of common council are made laws for the advancement of trade, and committees yearly appointed, &c. But acts made by them are to have the assent of the lord mayor and aldermen, by stat. 11 Geo. I. Also the chamberlain's court, where every thing relating to the rents and revenues of the city, as also the affairs of servants, &c. are transacted. Lastly, to the lord mayor belong the courts of coroner and of escheator; another court for the conservation of the river Thames; another of gaol-delivery, held usually eight times a year, at the Old Bailey, for the trial of criminals, whereof the lord mayor is himself the chief judge. There are other courts called wardmotes or meetings of the wards; and courts of halymote or assemblies of the several guilds and fraternities.

MA'YORALTY. *s.* (from *mayor.*) The office of a mayor (*Bacon*).

MA'YORESS. *s.* (from *mayor.*) The wife of a mayor.

MAYOW (John), whose discoveries in chemistry have astonished the scientific part of the public, descended, says Wood, from a genteel family living at Bree in the county of Cornwall. His father was probably a younger son, bred to business; for our author was born in Fleet-street, London, in the parish of St. Dunstan's in the West. At what school he received the rudiments of his education, a circumstance which the biographers of men eminent in the republic of letters should never omit, we have not been able to learn; but on the 27th of September 1661, when he had just completed his 16th year, he was admitted a scholar of Wadham college, Oxford. Some time afterwards, on the recommendation of Henry Coventry, Esq. one of the secretaries of state, he was chosen probationer fellow of All-souls college. As Wood informs us that he had here a legist's place, an expression by which we understand a law-fellowship, it is not wonderful that he took his degrees in the civil law, though physic and the physical sciences were the favourite objects of his study. He was indeed an eminent physician, practising both in London and in Bath, but in the latter city chiefly in the summer months, till the year 1679, when he died, some time during the month of September, in the house of an apothecary in York-street, Covent Garden, and was buried in the church of that parish. He had been married, says Wood, a little before his death, not altogether to his content; and indeed he must have been very discontented, if he chose to die in the house of a friend rather than in his own. He published, Tractatus quinque medico physici, 1. De salnitro; 2. De respiratione; 3. De respiratione fœtus in utero et ovo; 4. De motu musculari et spiritibus animalibus; 5. De Rachitide. These were published together in 8vo at Oxford, in 1674; but there is an edition of two of them, De respiratione, and De Rachitide, published together at Leyden in 1671.

The fame of this author has been lately revived and extended by Dr. Beddoes, who published, in 1790, Chemical Experiments and Opinions, extracted from a work published in the last century, 8vo; in which he gives to Mayow the highest credit as a chemist, and ascribes to him some of the greatest modern discoveries respecting air, giving many extracts from the three first of his treatises. His chief discovery was, that oxygen gas, to which he gave the name of *fire air*, exists in the nitrous acid, and in the atmosphere; which he proved by such decisive experiments, as to render it impossible to explain how Boyle and Hales could avoid availing themselves, in their researches into air, of so capital a discovery. Mayow also relates his manner of passing aeriform fluids under water, from vessel to vessel, which is generally believed to be a new art. He did not collect dephlogisticated air in vessels, and transfer it from one jar to another, but he proved its existence by finding substances that would burn in vacuo, and in water when mixed with nitre; and after animals had breathed and died in vessels filled with atmospheric air, or after fire had been extinguished in them, there was a residuum which was the part of the air unfit for respiration, and for supporting fire; and he further shewed, that nitrous acid cannot be formed, but by exposing the substances that generate it to the atmosphere. Mayow was undoubtedly no common man, especially since, if the above dates are right, he was only 34 at the time of his death. But he was not so unknown as Dr. Beddoes supposed; for since the repetition of the same discovery by Priestley and Scheele, reference has frequently been made by chemists to Mayow as the original inventor; thus allowing to him a species of merit, to which he has perhaps but a doubtful claim, and which, if that claim be well founded, must certainly be shared between him and Dr. Hooke.

MAZA, among the Athenians, was a sort of cake made of flour boiled with water and oil, and set, as the common fare, before such as were entertained at the public expence in the common hall or prytaneum.

MAZAGAN, a strong place of Africa, in the kingdom of Morocco, and on the frontiers of the province of Duguela. It was fortified by the Portuguese, and besieged by the king of Morocco with 200,000 men in 1562, but to no purpose. It is situated near the sea. Lon. 7. 45 W. Lat. 33. 5 N.

MAZARA, an ancient town of Sicily, and capital of a considerable valley of the same name, which is very fertile, and watered with several rivers. The town is a bishop's see, and has a good harbour; is seated on the sea coast, in lon. 12. 39 E. lat. 37. 42 N.

MAZARIN (Julius), a famous cardinal and prime minister of France, was born at Piscina in the province of Abruzzo, in Naples, in 1602. After having finished his studies in Italy and Spain, he entered into the service of cardinal Sachetti, and became well skilled in politics,

and in the interests of the princes at war in Italy; by which means he was enabled to bring affairs to an accommodation, and the peace of Queiras was shortly concluded. Cardinal Richelieu being taken with his conduct, did from thenceforward highly esteem him; as did also cardinal Antonio, and Louis XIII. who procured him a cardinal's hat in 1641. Richelieu made him one of the executors of his will; and during the minority of Louis XIV. he had the charge of affairs. At last he became the envy of the nobility, which occasioned a civil war: whereupon Mazarin was forced to retire, a price was set on his head, and his library sold. Notwithstanding, he afterwards returned to the court in more glory than ever; concluded a peace with Spain, and a marriage treaty betwixt the king and the infanta. This treaty of peace passes for the master-piece of cardinal de Mazarin's politics, and procured him the French king's most intimate confidence: but at last his continual application to business threw him into a disease, of which he died at Vincennes in 1661.—Cardinal Mazarin was of a mild and affable temper. One of his greatest talents was his knowing mankind, and his being able to adapt himself, and to assume a character conformable to the circumstances of affairs. He possessed at one and the same time the bishopric of Metz, and the abbeys of St. Arnauld, St. Clement, and St. Vincent, in the same city; that of St. Dennis, Clugny, and Victor, of Marseilles; of St. Michael at Soissons, and a great number of others. He founded Mazarin-college at Paris, which is also called the college of the four nations. There has been published a collection of his letters, the most copious edition of which is that of 1745, in 2 vols. duodecimo.

MA'ZARD. *s.* (*maschoire*, French.) A jaw (*Shakspeare*).

MAZE. *s.* (maꞅe, a whirlpool, *Skinner.*) 1. A labyrinth; a place of perplexity and winding passages (*Thomson*). 2. Confusion of thought; uncertainty; perplexity (*Sidney*).

*To* MAZE. *v. a.* (from the noun.) To bewilder; to confuse (*Spenser*).

MA'ZER. *s.* (*maeser*, Dutch.) A maple cup (*Spenser. Dryden*).

MA'ZY. *a.* (from *maze.*) Perplexed with windings; confused (*Dryden*).

M. D. *Medicinæ doctor*, doctor of physic.

ME. The oblique case of *I.*

ME'ACOCK. *s.* (*mes coq*, French. *Skinner.*) An uxorious or effeminate man.

ME'ACOCK. *a.* Tame; timorous; cowardly (*Shakspeare*).

MEAD. (mæꝺe, Saxon.) A wholesome, agreeable liquor, prepared of honey and water. One of the best methods of preparing mead is as follows: into twelve gallons of water slip the whites of six eggs; mixing these well together, and to the mixture adding twenty pounds of honey. Let the liquor boil an hour, and when boiled add cinnamon, ginger, cloves, mace, and a rosemary. As soon as it is cold, put a spoonful of yeast to it, and tun it up, keeping the vessel filled as it works; when it has done working, stop it up close; and, when fine, bottle it off for use.

Thorley says, that mead not inferior to the best of foreign wines may be made in the following manner: Put three pounds of the finest honey to one gallon of water, and two lemon peels to each gallon; boil it half an hour, well scummed; then put in, while boiling, lemon peel: work it with yeast; then put it in your vessel with the peel, to stand five or six months, and bottle it off for use. If it is to be kept for several years, put four pounds to a gallon of water.

The author of the Dictionary of Chemistry directs to choose the whitest, purest, and best tasted honey, and to put it into a kettle with more than its weight of water: a part of this liquor must be evaporated by boiling, and the liquor scummed, till its consistence is such, that a fresh egg shall be supported on its surface without sinking more than half its thickness into the liquor; then the liquor is to be strained, and poured through a funnel into a barrel; this barrel, which ought to be nearly full, must be exposed to a heat as equable as possible, from 20 to 27 or 28 degrees of Mr. Reaumur's thermometer, taking care that the bung-hole be slightly covered, but not closed. The phenomena of the spirituous fermentation will appear in this liquor, and will subsist during two or three months, according to the degree of heat; after which they will diminish and cease. During this fermentation, the barrel must be filled up occasionally with more of the same kind of liquor of honey, some of which ought to be kept apart, on purpose to replace the liquor which flows out of the barrel in froth. When the fermentation ceases, and the liquor has become very vinous, the barrel is then to be put into a cellar, and well closed; a year afterwards the mead will be fit to be put into bottles.

Mead is an agreeable kind of wine; nevertheless it retains long a taste of honey, which is unpleasing to some persons; but this taste it is said to lose entirely by being kept a very long time. The spirituous fermentation of honey, as also that of sugar, and of the most of vinous liquors, when it is very saccharine, is generally more difficultly effected, requires more heat, and continues longer than that of ordinary wines made from the juice of grapes; and these vinous liquors always preserve a saccharine taste, which shows that a part only of them is become spirituous.

MEAD (Dr. Richard), a celebrated English physician, was born at Stepney near London, where his father, the reverend Mr. Matthew Mead, had been one of the two ministers of that parish; but in 1662 was ejected for nonconformity, but continued to preach at Stepney till his death. As Mr. Mead had a handsome fortune, he bestowed a liberal education upon 13 children, of whom Richard was the eleventh; and for that purpose kept a private tutor in his house, who taught him the Latin tongue. At 16 years of age Richard was sent to Utrecht, where he studied three years

under the famous Grævius; and then choosing the profession of physic, he went to Leyden, where he attended the lectures of the famous Pitcairn on the theory and practice of medicine, and Hermon's botanical courses. Having also spent three years in these studies, he went with his brother and two other gentlemen to visit Italy, and at Padua took his degree of doctor of philosophy and physic in 1695. Afterwards he spent some time at Naples and at Rome; and returning home the next year, settled at Stepney, where he married, and practised physic with a success that laid the foundation of his future greatness.

In 1703, Dr. Mead having communicated to the Royal Society an analysis of Dr. Bonomo's discoveries relating to the cutaneous worms that generate the itch, which they inserted in the Philosophical Transactions; this, with his account of poisons, procured him a place in the Royal Society, of which sir Isaac Newton was then president. The same year he was elected physician of St. Thomas's hospital, and was also employed by the surgeons to read anatomical lectures in their hall, which obliged him to remove into the city. In 1707 his Paduan diploma for doctor of physic was confirmed by the university of Oxford; and being patronized by Dr. Radcliffe, on the death of that famous physician he succeeded him in his house at Bloomsbury-square, and in the greatest part of his business. In 1727 he was made physician to king George II. whom he had also served in that capacity while he was prince of Wales; and he had afterwards the pleasure of seeing his two sons-in-law, Dr. Nichols and Dr. Wilmot, his coadjutors in that eminent station.

Dr. Mead was not more to be admired for the qualities of the head than he was to be loved for those of his heart. Though he was himself a hearty whig, yet, uninfluenced by party-principles, he was a friend to all men of merit, by whatever denomination they might happen to be distinguished. Thus he was intimate with Garth, with Arbuthnot, and with Freind; and long kept up a constant correspondence with the great Boerhaave, who had been his fellow-student at Leyden: they communicated to each other their observations and projects, and never loved each other the less for being of different sentiments.

No foreigner of learning ever came to London without being introduced to Dr. Mead; and on these occasions his table was always open, and the magnificence of princes was united with the pleasures of philosophers. It was principally to him that the several counties of England and our colonies abroad applied for the choice of their physicians, and he was likewise consulted by foreign physicians from Russia, Prussia, Denmark, &c. He wrote, besides the above works, 1. A Treatise on the Scurvy. 2. De variolis et morbillis dissertatio. 3. Medica sacra: sive de Morbis insignioribus, qui in Bibliis memorantur, Commentarius. 4. Monita et Præcepta medica. 5. A Discourse concerning pestilential contagion, and the methods to be used to prevent it. The works he wrote and published in Latin were translated into English, under the doctor's inspection, by Thomas Stack, M. D. and F. R. S. This great physician, naturalist, and antiquarian, died on the 16th of February 1754.

MEADOW, generally signifies pasture, or grass land, that is annually mown for hay; but it more particularly denotes such tracts of ground as are too low, and too moist for cattle to graze on them during the winter, without injuring the sward.

The best lands for meadow are those situated on a gentle declivity, so as to be irrigated at pleasure, and which at the same time possess a rich soil and moist bottom, especially if it be in the vicinity of a brook, or small running stream. See IRRIGATION.

Great Britain and Ireland are reputed to possess the most verdant pastures, and the finest natural grasses in the vegetable creation; these advantages, however, do not appear to meet with that attention which they deserve. Lately, indeed, the cultivation of grasses has been a favourite pursuit amongst experimental farmers and freeholders; but, as the tenantry in general are bound to follow a certain rotation of crops, without having the power of breaking up old and unproductive meadows, extensive improvements cannot be expected, while such limitations prevail.—We have cursorily mentioned these obstacles to national prosperity; because they would require a more ample investigation than is compatible with our limits.

The first requisite towards obtaining a good meadow is, a perfect acquaintance with the best natural grasses, their peculiar soils, and the best mode of collecting their seeds: the most valuable are those of the northern and eastern parts of England. But, as comparatively few have an opportunity of procuring such seeds, the only method that can be pursued with hopes of success appears to be that of selecting those grasses, which thrive luxuriantly on a similar soil; and to gather the ripe seed from a productive old meadow.

On lands intended for pasture, and especially for sheep, it is advisable to sow three kinds of vegetables, with a view to gain the advantage of successive growth. Thus, Mr. Parkinson sows four bushels of the seed of ray-grass, or red darnel (*lolium perenne*, L.); 10lbs. of trefoil seed (more properly common clover, *trifolium pratense*, L.); and a similar quantity of white clover (*t. repens*, L.). He is of opinion that the ray-grass should be grazed early, while the white clover is still concealed in the ground, and the trefoil, or common clover, is just appearing; that, when the darnel is eaten down, the common clover will spring up, and afford excellent food for sheep, after which the white clover will appear; and, when the latter is consumed, the ray-grass again grows, and supplies pasturage during the winter months, if the weather prove tolerably mild. Hence this truly "experienced farmer" maintains, that one-third more in number of sheep, at least,

may be thus supported than by any other method. See HUSBANDRY.

MEADOW-GRASS. See POA.

MEADOW-RUE. See THALICTRUM.

MEADOW-SAFFRON. See COLCHICUM.

MEADOW-SAXIFRAGE. See PEUCEDANUM.

MEADOW-SWEET. See SPIRÆA.

MEADOW (Queen of the). See SPIRÆA.

MEADIA, a town of Hungary, in the bannat of Temesvar, on a small river which runs into the Danube, twelve miles N. Orsova, and fifty-two SE. Temesvar.

ME'AGER. *a.* (*maigre*, French.) 1. Lean; wanting flesh; starved (*Dryden*). 2. Poor; hungry (*Dryden*).

*To* ME'AGER. *v. a.* (from the adjective.) To make lean (*Knolles*).

ME'AGERNESS. *s.* (from *meagre.*) 1. Leanness; want of flesh. 2. Scantiness; bareness (*Bacon*).

MEAK. *s.* A hook with a long handle (*Tusser*).

MEAL. *s.* (male, Saxon.) 1. The act of eating at a certain time (*Arbuthnot*). 2. A repast; the food eaten (*Shakspeare*). 3. A part; a fragment (*Bacon*). 4. (mælepe, Saxon; *meel*, Dutch.) The flour or edible part of corn (*Wotton*)

*To* MEAL. *v. a.* (*meler*, French.) To sprinkle; to mingle (*Shakspeare*).

ME'ALMAN. *s.* (*meal* and *man.*) One that deals in meal.

ME'ALY. *a.* (from *meal.*) 1. Having the taste or soft insipidity of meal; having the qualities of meal (*Arbuthnot*). 2. Besprinkled, as with meal (*Brown*).

ME'ALY-MOUTHED. *a.* Soft mouthed; unable to speak freely (*L'Estrange*).

MEALY-MOUTHEDNESS. *s.* Bashfulness; restraint of speech.

MEALY-TREE PLIANT. A provincial name for the viburnum or guelder-rose.

MEAN. *a.* (mœne, Saxon.) 1. Wanting dignity; of low rank or birth. 2. Low-minded; base; ungenerous; spiritless (*Smalridge*). 3. Contemptible; despicable (*Philips*). 4. Low in the degree of any good quality; low in worth; low in power (*Dryden*). 5. (*moyen*, French.) Middle; moderate; without excess (*Sidn.*). 6. Intervening; intermediate (*Kings*).

MEAN. *s.* (*moyen*, French.) 1. Mediocrity; middle rate; medium (*Sh.*). 2. Measure; regulation: not used (*Spenser*). 3. Interval; interim; mean time (*Spenser*). 4. Instrument; measure; that which is used in order to any end (*Hooker*). 5. *By all* MEANS. Without doubt; without hesitation; without fail. 6. *By no* MEANS. Not in any degree; not at all (*Addison*). 7. Revenue; fortune (*Shakspeare*). 8. MEAN-TIME or MEAN-WHILE. In the intervening time (*Dryden. Addison*).

*To* MEAN. *v. n.* (*meenen*, Dutch.) 1. To have in the mind; to purpose (*Milton*). 2. To think (*Pope*).

*To* MEAN. *v. a.* 1. To purpose; to intend; to design (*Milton*). 2. To intend; to hint covertly; to understand (*Dryden*).

MEAN (Arithmetical), is half the sum of the extremes. So 4 is an arithmetical mean between 2 and 6, or between 3 and 5, or between 1 and 7; also an arithmetical mean between $a$ and $b$ is $\frac{a+b}{2}$, or $\frac{1}{2}a+\frac{1}{2}b$.

MEAN (Geometrical), commonly called a mean proportional, is the square root of the product of the two extremes; so that, to find a mean proportional between two given extremes, multiply these together, and extract the square root of the product. Thus a mean proportional between 1 and 9, is $\sqrt{1\times 9}=\sqrt{9}=3$; a mean between 2 and $4\frac{1}{2}$ is $\sqrt{2\times 4\frac{1}{2}}=\sqrt{9}=3$ also; the mean between 4 and 6 is $\sqrt{4\times 6}=\sqrt{24}$; and the mean between $a$ and $b$ is $\sqrt{ab}$.

MEAN (Harmonical.) See HARMONICAL PROPORTION.

MEAN AND EXTREME PROPORTION, or EXTREME AND MEAN PROPORTION, is when a line or any quantity is so divided that the less part is to the greater, as the greater is to the whole.

MEAN ANOMALY OF A PLANET, is an angle which is always proportional to the time of the planet's motion from the aphelion or perihelion, or proportional to the area described by the radius vector; that is, as the whole periodic time in one revolution of the planet, is to the time past the aphelion or perihelion, so is 360° to the mean anomaly. See ANOMALY.

MEAN CONJUNCTION OF OPPOSITION, is when the mean place of the sun is in conjunction, or opposition, with the mean place of the moon in the ecliptic.

MEAN DISTANCE OF A PLANET FROM THE SUN, is an arithmetical mean between the planet's greatest and least distances.

MEAN MOTION, is that by which a planet is supposed to move equably in its orbit; and it is always proportional to the time.

MEAN TIME, OF EQUAL TIME, is that which is measured by an equable motion, as a clock; as distinguished from apparent time, arising from the unequal motion of the earth or sun.

MEA'NDER. *s.* Maze; labyrinth; flexuous passage; serpentine winding (*Hale*).

MEA'NDROUS. *a.* (from *meander.*) Winding; flexuous.

ME'ANING. *s.* (from *mean.*) 1. Purpose; intention (*Shakspeare*). 2. Habitual intention (*Roscommon*). 3. The sense; the thing understood (*Pope*). 4. Sense; power of thinking (*Pope*).

ME'ANLY. *ad.* (from *mean.*) 1. Moderately; not in a great degree (*Dryden*). 2. Without dignity; poorly (*Milton*). 3. Without greatness of mind; ungenerously (*Prior*). 4. Without respect (*Watts*).

ME'ANNESS. *s.* (from *mean.*) 1. Want of excellence (*Hooker*). 2. Want of dignity; low rank; poverty. 3. Lowness of mind (*South*). 4. Sordidness; niggardliness.

MEANT. perf. and part. pass. of *to mean.*

MEANTES, or rather MEANTIA. In zoology, the name of a third order of amphibials, as proposed to be given by Linnéus, in order to

include the siren tribe, whose character is peculiarly ambiguous. See SIREN, as also ZOOLOGY.

MEAO, one of the small Molucca islands in the Eastern Indian sea. Lon. 127. 3 E. Greenwich. Lat. 1. 12 N.

MEARNS. See KINCARDINESHIRE.

MEASE, five hundred of herrings.

MEASLES, a cutaneous disease, attended with a fever, in which there is an appearance of eruptions that do not tend to suppuration. See MEDICINE.

ME'ASLED. *a.* (from *measles.*) Infected with the measles (*Hudibras*).

ME'ASLY. *a.* (from *measles.*) Scabbed with the measles (*Swift*).

ME'ASURABLE. *a.* (from *measure.*) 1. Such as may be measured (*Bentley*). 2. Moderate; in small quantity.

ME'ASURABLENESS. *s.* Quality of admitting to be measured.

ME'ASURABLY. *ad.* Moderately. (*Ecclus.*)

ME'ASURE. *s.* (*mesure*, French.) 1. That by which any thing is measured (*Arbuthnot*). 2. The rule by which any thing is adjusted or proportioned (*More*). 3. Proportion; quantity settled (*Hooker*). 4. A stated quantity (*Shakspeare*). 5. Sufficient quantity (*Shakspeare*). 6. Allotment; portion allotted (*Tillotson*). 7. Degree; quantity (*Abbot*). 8. Proportionate time; musical time (*Prior*). 9. Motion harmonically regulated (*Dryden*). 10. A stately dance (*Shakspeare*). 11. Moderation; not excess (*Isaiah*). 12. Limit; boundary (*Psalms*). 13. Any thing adjusted (*Smalridge*). 14. Syllables metrically numbered; metre. 15. Tune; proportionate notes (*Spenser*). 16. Mean of action; mean to an end (*Clarendon*). 17. To have hard *measure*; to be hardly treated.

*To* ME'ASURE. *v. a.* (*mesurer*, French.) 1. To compute the quantity of any thing by some settled rule (*Bacon*). 2. To pass through; to judge of extent by marching over (*Dryden*). 3. To judge of quantity or extent, or greatness (*Milton*). 4. To adjust; to proportion (*Taylor*). 5. To mark out in stated quantities (*Addison*). 6. To allot or distribute by measure (*Matt.*).

MEASURES, in botany. Linnéus seldom makes use of any other measure besides the proportion between the parts. Since plants vary exceedingly in the size both of the whole and all the parts, he has discarded geometrical measures, and has adopted others taken principally from the human hand and arm.

1. Capillus. A hair. The diameter of a hair. One-twelfth of a line.

2. Linea. A line. The length of the little crescent at the root of the finger nail. One-twelfth of an inch.

3. Unguis. A nail. The length of a nail. Half an inch.

4. Pollex. An inch. The length of the first joint of the thumb.

5. Palmus. A palm, or hand. The breadth of the four fingers. Three inches.

6. Spithama. A short span. The space between the end of the thumb and the fore-finger extended. Seven inches.

7. Dodrans. A long span. The space between the end of the thumb and of the little finger extended. Nine inches.

8. Pes. A foot. From the bend of the elbow to the base of the thumb. Twelve inches.

9. Cubitus. A cubit. From the bend of the elbow to the end of the middle finger. Seventeen (Paris) inches: or something more than eighteen inches English.

10. Brachium. An arm. From the arm-pit to the end of the middle finger. Twenty-four inches.

11. Orgya. A fathom. The height of a man, or the space between the ends of the fingers when the arms are extended.

The above geometrical measures follow the French standard; and it should be observed that the English foot is eleven inches and a quarter French, nearly. Our hand is the breadth of the palm, or about four inches. And the Roman palm is 8.78 for architecture, and 9.79 in buying goods; English measure.

MEASURE, in geometry, denotes any quantity assumed as one, or unity, to which the ratio of other homogeneous or similar quantities is expressed. This definition is somewhat more agreeable to practice than that of Euclid, who defines measure, a quantity which being repeated any number of times becomes equal to another. This latter definition answers only to the idea of an arithmetical measure, or quota-part.

MEASURE OF AN ANGLE, is an arch described from the vertex in any place between its legs. Hence angles are distinguished by the ratio of the arches, described from the vertex between the legs to the peripheries. Angles then are distinguished by those arches; and the arches are distinguished by their ratio to the periphery: thus an angle is said to be of so many degrees as there are in the said arch. See ANGLE.

MEASURE OF A SOLID ANGLE, is the surface of the spherical triangle, or other polygon intercepted by the planes which determine the solid angle. See SOLID ANGLE.

MEASURE OF A FIGURE, or plane surface, is a square whose side is one inch, foot, yard, or some other determinate length. Among geometricians, it is usually a rod called a square rod, divided into ten square feet, and the square feet into ten square digits: hence square measures.

MEASURE OF A LINE, any right line taken at pleasure, and considered as unity. The modern geometricians use a decempeda, or perch, divided into ten equal parts, called feet; the feet they subdivide into ten digits, and the digit into ten lines, &c.

MEASURE OF THE MASS, OR QUANTITY OF MATTER, in mechanics, is its weight; it being apparent that all the matter which coheres and moves with a body gravitates with it, and it being found by experiment that the gravities of homogeneal bodies are in proportion to their bulks, hence, while the mass continues the same, the weight will be the same, whatever figure it put on; by which is meant its absolute weight, for as to its specific, that varies as the quantity of the surface varies.

MEASURE OF A NUMBER, in arithmetic, such a number as divides another without leaving any fraction: thus 9 is a measure of 27.

MEASURE OF A SOLID, is a cube whose side is one inch, foot, yard, or any other determinate length. In geometry, it is a cubic perch, divided into cubic feet, digits, &c. hence cubic measures, or measures of capacity.

MEASURE OF VELOCITY, in mechanics, the space passed over by a moving body in a given time. To

measure a velocity therefore, the space must be divided into as many equal parts as the time is conceived to be divided into; the quantity of space answering to such an article of time is the measure of the velocity.

Measure for horses, is the hand, which, by statute, contains four inches.

Measure, in a legal and commercial sense, denotes a certain quantity or proportion of any thing bought, sold, valued, or the like. It is necessary, for the convenience of commerce, that an uniformity should be observed in weights and measures, and regulated by proper standards. A foot-rule may be used as a standard for measures of length, a bushel for measures of capacity, and a pound for weights. There should be only one authentic standard of each kind, formed of the most durable materials, and kept with all possible care. A sufficient number of copies, exactly corresponding to the principal standard, may be distributed for adjusting the weights and measures that are made for common use. There are several standards of this kind both in England and Scotland. See the article Weights and Measures.

If any one of the standards above mentioned be justly preserved, it will serve as a foundation for the others, by which they may be corrected if inaccurate, or restored if entirely lost. For instance, if we have a standard foot, we can easily obtain an inch, and can make a box which shall contain a cubical inch, and may serve as a standard for measures of capacity. If it be known that a pint contains 100 cubical inches, we may make a vessel five inches square, and four inches deep, which will contain a pint. If the standard be required in any other form, we may fill this vessel with water, and regulate another to contain an equal quantity. Standards for weights may be obtained from the same foundation; for, if we know how many inches of water it takes to weigh a pound, we have only to measure that quantity, and the weight which balances it may be assumed as the standard of a pound.

Again, if the standard of a pound be given, the measure of an inch may be obtained from it: for we may weigh a cubical inch of water, and pour it into a regular vessel; and having noticed how far it is filled, we may make another vessel of like capacity in the form of a cube. The side of this vessel may be assumed as the standard for an inch; and standards for a foot, a pint, or a bushel, may be obtained from it. Water is the most proper substance for regulating standards; for all other bodies differ in weight from others of the same kind; whereas it is found by experience that spring and river water, rain, and melted snow, and all other kinds, have the same weight; and this uniformly holds in all countries when the water is pure, alike warm, and free from salt and minerals.

Thus, any one standard is sufficient for restoring all the rest.

Measures are various, according to the various kinds and dimensions of the things measured.—Hence arise lineal or longitudinal measures, for lines or lengths; square measures, for areas or superfices; and solid or cubic measures, for bodies and their capacities: all which again are very different in different countries and in different ages, and even many of them for different commodities. Whence arise other divisions of ancient and modern measures, domestic and foreign ones, dry measures, liquid measures, &c.

*Long Measures, or Measures of Application.*

1. The English and Scotch standards.

The English lineal standard is the yard, containing 3 English feet; equal to 3 Paris feet 1 inch and $1\frac{3}{2}$ of an inch, or $\frac{7}{9}$ of a Paris ell. The use of this measure was established by Henry I. of England, and the standard taken from the length of his own arm. It is divided into 36 inches, and each inch is supposed equal to 3 barley-corns. When used for measuring cloth, it is divided into four quarters, and each quarter subdivided into 4 nails. The English ell is equal to a yard and a quarter, or 45 inches, and is used in measuring linens imported from Germany and the Low-countries.

The Scots elwand was established by king David I. and divided into 37 inches. The standard is kept in the council-chamber of Edinburgh, and, being compared with the English yard, is found to measure $37\frac{1}{5}$ inches; and therefore the Scots inch and foot are larger than the English, in the proportion of 180 to 185; but this difference being so inconsiderable, is seldom attended to in practice. The Scots ell, though forbidden by law, is still used for measuring some coarse commodities, and is the foundation of the land measure of Scotland.

Itinerary measure is the same both in England and Scotland. The length of the chain is 4 poles, or 22 yards; 80 chains make a mile. The old Scots computed miles were generally about a mile and a half each.

The reel for yarn is $2\frac{2}{9}$ yards, or 10 quarters, in circuit; 120 threads make a cut, 12 cuts make a hasp or hank, and 4 hanks make a spindle.

2. The French standard is the aune or ell, containing 3 Paris feet 7 inches 8 lines, or 1 yard $\frac{2}{9}$ English; the Paris foot royal exceeding the English by $\frac{68}{1000}$ parts, as in one of the following tables. This ell is divided two ways, viz. into halves, thirds, sixths, and twelfths; and into quarters, half-quarters, and sixteenths.

The French, however, have since their revolution formed an entirely new system of weights and measures, according to the following table.

| Proportions of the measures of each species to its principal measure or unity. | First part of the name which indicates the proportion to the principal measure or unity. | PRINCIPAL MEASURES OR UNITIES. | | | | |
|---|---|---|---|---|---|---|
| | | Length. | Capacity. | Weight. | Agrarian. | For firewood. |
| 10,000<br>1,000<br>100<br>10<br>0<br>0.1<br>0.01<br>0.001 | Myria<br>Kilo<br>Hecto<br>Deca<br>—<br>Deci<br>Centi<br>Milli | Metre. | Litre. | Gramme. | Are. | Stere. |
| Proportion of the principal measures between themselves, and the length of the meridian. | | 10,000,000th part of the dist. from the pole to the equator. | A decimetre cube. | Weight of a centimetre cube of distilled water. | 100 square metres. | One cubic metre. |
| Value of the principal measures in the ancient French measures. | | 3 feet 11 lines and $\frac{1}{2}$ nearly. | 1 pint and $\frac{1}{20}$, or 1 litron and $\frac{1}{4}$ nearly. | 18 grains and 841,000 parts. | Two square perches des eaux et forêt. | 1 demi-voie, or $\frac{1}{4}$ of a cord des eaux et forêt. |
| Value in English measures. | | Inches 39.383. | 61.042 inch. which is more than the wine and less than the beer quart. | 15.444 grains. | 3.95 square perches. | 35.315 cubic feet. |

3. The English avoirdupois pound weighs 7004 troy grains; whence the avoirdupois ounce, whereof 16 make a pound, is found equal to 437.75 troy grains. And it follows, that the troy pound is to the avoirdupois pound as 88 to 107 nearly; for as 88 to 107, so is 5760 to 7003.636: that the troy ounce is to the avoirdupois ounce, as 80 to 73 nearly; for as 80 to 73, so is 480 to 438: and, lastly, that the avoirdupois pound and ounce are to the Paris two-marc weight and ounce, as 63 to 68 nearly; for as 63 to 68, so is 7004 to 7559.873. See Weight. The Paris foot expressed in decimals is equal to 1.0654 of the English foot, or contains 12.785 English inches.

4. The standard in Holland, Flanders, Sweden, a good part of Germany, many of the Hanse-towns, as Dantzick and Hamburgh, and at Geneva, Franckfort, &c. is likewise the ell; but the ell in all these places differs from the Paris ell. In Holland it contains one Paris foot 11 lines, or 4-sevenths of the Paris ell. The Flanders ell contains 2 feet 1 inch 5 lines and half a line, or 7-twelfths of the Paris ell. The ell of Germany, Brabant, &c. is equal to that of Flanders.

5. The Italian measure is the bracchio, brace, or fathom. This obtains in the states of Modena, Venice, Florence, Lucca, Milan, Mantua, Bologna, &c. but is of different lengths. At Venice it con-

tains 1 Paris foot, 11 inches, 3 lines, or 8-fifteenths of the Paris ell. At Bologna, Modena, and Mantua, the brace is the same as at Venice. At Lucca it contains 1 Paris foot, 9 inches, 10 lines, or half a Paris ell. At Florence it contains 1 foot, 9 inches, 4 lines, or 49-hundredths of a Paris ell. At Milan, the brace for measuring of silks is 1 Paris foot, 7 inches, 4 lines, or 4-ninths of a Paris ell; that for woollen cloths is the same with the ell of Holland. Lastly, at Bergama, the brace is 1 foot, 7 inches, 6 lines, or 5-ninths of a Paris ell. The usual measure at Naples, however, is the canna, containing 6 feet, 10 inches, and 2 lines, or one Paris ell and 15-seventeenths.

6. The Spanish measure is the vara or yard, in some places called the barra; containing 17 twenty-fourths of the Paris ell. But the measure in Castile and Valencia is the pan, span, or palm; which is used, together with the canna, at Genoa. In Arragon, the vara is equal to a Paris ell and a half, or 5 feet, 5 inches, 6 lines.

7. The Portuguese measure is the cavedos, containing 2 feet, 11 lines, or 4-sevenths of a Paris ell; and the vara, 106 whereof make a 100 Paris ells.

8. The Piedmontese measure is the ras, containing 1 Paris foot, 9 inches, 10 lines, or half a Paris ell. In Sicily, their measure is the canna, the same with that of Naples.

9. The Muscovite measures are the cubit, equal to 1 Paris foot, 4 inches, 2 lines; and the arcin, two whereof are equal to 3 cubits.

10. The Turkish and Levant measures are the picq, containing 2 feet, 2 inches, and 2 lines, or three-fifths of the Paris ell. The Chinese measure is the cobre, ten whereof are equal to three Paris ells. In Persia, and some parts of the Indies, the gueze, of which there are two kinds; the royal gueze, called also the gueze monkelser, containing 2 Paris feet, 10 inches, 11 lines, or four-fifths of the Paris ell; and the shorter gueze, called simply gueze, only two-thirds of the former. At Goa and Ormuz, the measure is the vara, the same with that of the Portuguese, having been introduced by them. In Pegu, and some other parts of the Indies, the cando or candi, equal to the ell of Venice. At Goa, and other parts, they use a larger cando, equal to 17 Dutch ells, exceeding that of Babel and Balsora by $\frac{7}{8}$ per centum, and the vara by $6\frac{1}{2}$. In Siam, they use the ken, short of three Paris feet by one inch. The ken contains two soks, the sok two keubs, the keub 12 nious or inches, the niou to be equal to eight grains of rice, *i. e.* to about nine lines. At Camboia they use the haster; in Japan the tatam; and the span on some of the coasts of Guinea.

English Measures of Length.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Barley-corns | | | | | | | | | | | |
| 3 | Inch | | | | | | | | | | |
| 9 | 3 | Palm | | | | | | | | | |
| 27 | 9 | 3 | Span | | | | | | | | |
| 36 | 12 | 4 | $1\frac{1}{3}$ | Foot | | | | | | | |
| 54 | 18 | 6 | 2 | $1\frac{1}{2}$ | Cubit | | | | | | |
| 108 | 36 | 12 | 4 | 3 | 2 | Yard | | | | | |
| 180 | 60 | 20 | $6\frac{2}{3}$ | 5 | $3\frac{1}{3}$ | $1\frac{2}{3}$ | Pace | | | | |
| 216 | 72 | 24 | 8 | 6 | 4 | 2 | $1\frac{1}{5}$ | Fathom | | | |
| 594 | 198 | 66 | 22 | $16\frac{1}{2}$ | 11 | $5\frac{1}{2}$ | $3\frac{3}{10}$ | $2\frac{3}{4}$ | Pole | | |
| 23760 | 7920 | 2640 | 880 | 660 | 440 | 220 | 132 | 110 | 40 | Furlong | |
| 190080 | 63360 | 21120 | 7040 | 5280 | 3520 | 1760 | 1056 | 880 | 320 | 8 | Mile. |

Scripture Measures of Length, reduced to English.

| | | | | | | | | Eng. feet. | inch. Dec. |
|---|---|---|---|---|---|---|---|---|---|
| Digit | | | | | | | | 0 | 0.912 |
| 4 | Palm | | | | | | | 0 | 3.648 |
| 12 | 3 | Span | | | | | | 0 | 10.944 |
| 24 | 6 | 2 | Cubit | | | | | 1 | 9.888 |
| 96 | 24 | 8 | 4 | Fathom | | | | 7 | 3.552 |
| 144 | 36 | 12 | 6 | $1\frac{1}{2}$ | Ezechiel's reed | | | 10 | 11.328 |
| 192 | 48 | 16 | 8 | 2 | $1\frac{1}{3}$ | Arabian pole | | 14 | 7.104 |
| 1920 | 480 | 160 | 80 | 20 | $13\frac{1}{3}$ | 10 | Schœnus, or measuring line | 145 | 11.04 |

# MEASURES.

## The Longer Scripture-Measures.

| | | | | | | English. miles. | paces. | feet. |
|---|---|---|---|---|---|---|---|---|
| Cubit | | | | | | 0 | 0 | 1.824 |
| 400 | Stadium | | | | | 0 | 145 | 4.6 |
| 2000 | 5 | Sab. day's journey | | | | 0 | 729 | 3.000 |
| 4000 | 10 | 2 | Eastern mile | | | 1 | 403 | 1.000 |
| 12000 | 30 | 6 | 3 | Parasang | | 4 | 153 | 3.000 |
| 96000 | 240 | 48 | 24 | 8 | A day's journey | 33 | 172 | 4.000 |

## Grecian Measures of Length, reduced to English.

| | | | | | | | | | | | | English Paces. | feet. | dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dactylus, digit | | | | | | | | | | | | 0 | 0 | $0.7554\frac{11}{11}$ |
| 4 | Doron, dochme | | | | | | | | | | | 0 | 0 | $3.0218\frac{3}{4}$ |
| 10 | $2\frac{1}{2}$ | Lichas | | | | | | | | | | 0 | 0 | $7.5546\frac{7}{8}$ |
| 11 | $2\frac{3}{4}$ | $1\frac{1}{10}$ | Orthodoron | | | | | | | | | 0 | 0 | $8.3101\frac{9}{16}$ |
| 12 | 3 | $1\frac{1}{5}$ | $1\frac{1}{1}$ | Spithame | | | | | | | | 0 | 0 | $9.0656\frac{1}{4}$ |
| 16 | 4 | $1\frac{6}{10}$ | $1\frac{5}{11}$ | $1\frac{1}{3}$ | Foot | | | | | | | 0 | 1 | 0.0875 |
| 18 | $4\frac{1}{2}$ | $1\frac{4}{5}$ | $1\frac{7}{11}$ | $1\frac{1}{2}$ | $1\frac{1}{8}$ | Cubit | | | | | | 0 | 1 | $1.5984\frac{3}{8}$ |
| 20 | 5 | 2 | $1\frac{9}{11}$ | $1\frac{2}{3}$ | $1\frac{1}{4}$ | $1\frac{1}{9}$ | Pygon | | | | | 0 | 1 | $3.109\frac{3}{8}$ |
| 24 | 6 | $2\frac{2}{5}$ | $2\frac{2}{11}$ | 2 | $1\frac{1}{2}$ | $1_{3}$ | $1\frac{1}{5}$ | Cubit larger | | | | 0 | 1 | 6.13125 |
| 96 | 24 | $9\frac{3}{5}$ | $8\frac{8}{11}$ | 8 | 6 | $5^{3}$ | $4\frac{4}{5}$ | 4 | Pace | | | 0 | 6 | 0.525 |
| 9600 | 2400 | 960 | $872\frac{8}{11}$ | 800 | 600 | $533\frac{4}{3}$ | 480 | 400 | 100 | Furlong | | 100 | 4 | 4.5 |
| 76800 | 19200 | 7680 | $6981\frac{9}{11}$ | 6400 | 4800 | $4266\frac{2}{3}$ | 3840 | 3200 | 800 | 8 | Mile | 805 | 5 | 0 |

## Roman Measures of Length, reduced to English.

| | | | | | | | | | | English Paces. | feet. | dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Digitus transversus | | | | | | | | | | 0 | 0 | $0.725\frac{1}{4}$ |
| $1\frac{1}{3}$ | Uncia | | | | | | | | | 0 | 0 | 0.967 |
| 4 | 3 | Palmus minor | | | | | | | | 0 | 0 | 2.901 |
| 16 | 12 | 4 | Pes | | | | | | | 0 | 0 | 11.604 |
| 20 | 15 | 5 | $1\frac{1}{4}$ | Palmipes | | | | | | 0 | 1 | 2.505 |
| 24 | 18 | 6 | $1\frac{1}{2}$ | $1\frac{1}{5}$ | Cubitus | | | | | 0 | 1 | 5.406 |
| 40 | 30 | 10 | $2\frac{1}{2}$ | 2 | $1\frac{2}{3}$ | Gradus | | | | 0 | 2 | 5.01 |
| 80 | 60 | 20 | 5 | 4 | $3\frac{1}{3}$ | 2 | Passus | | | 0 | 4 | 10.02 |
| 10000 | 7500 | 2500 | 625 | 500 | $416\frac{2}{3}$ | 250 | 125 | Stadium | | 120 | 4 | 4.5 |
| 80000 | 60000 | 20000 | 5000 | 4000 | $3333\frac{1}{3}$ | 2000 | 1000 | 8 | Milliare | 967 | 0 | 0 |

## A Table of the Measures of Length of the principal Places compared with the English Foot.

### ANCIENT MEASURES.

| | |
|---|---|
| Arabian foot | 1.095 |
| Egyptian foot | 1.421 |
| Egyptian stadium | 730.8 |
| Greek foot | 1.009 |
| —— phyletarian foot | 1.167 |
| Hebrew foot | 1.212 |
| —— cubit | 1.817 |
| —— sacred cubit | 2.002 |
| —— great cubit = six common cubits. | |

| | |
|---|---|
| Natural foot | .814 |
| Roman foot | .970 |
| —— (after Titus) | .965 |
| —— (from rules) | .9672 |
| —— (from buildings) | .9681 |
| —— (from a stone) | .9696 |
| Roman mile of Pliny | 4840.5 |
| —— of Strabo | 4903. |
| Sicilian foot of Archimedes | .730 |

MODERN MEASURES.

| | |
|---|---|
| Amsterdam foot | .927 |
| —— ell | 2.233 |
| Antwerp foot | .940 |
| Barcelona foot | .992 |
| Basle foot | .944 |
| Bavarian foot | .968 |
| Berlin foot | .992 |
| Bologna foot | 1.244 |
| Brabant ell in Germany | 2.268 |
| Brescia foot | 1.560 |
| Brescian braccio | 2.092 |
| Brussels foot | .902 |
| —— greater ell | 2.278 |
| —— lesser ell | 2.245 |
| China mathematical foot | 1.127 |
| —— Imperial foot | 1.051 |
| Chinese li | 606. |
| Constantinople foot | 2.195 |
| Copenhagen foot | 1.049 |
| Dresden foot | .929 |
| —— ell = 2 feet | 1.857 |
| Florence foot | .995 |
| —— braccio | 1.900 |
| Genoa palm | .812 |
| —— canna | 7.300 |
| Geneva foot | 1.919 |
| Hamburgh foot | .933 |
| Lisbon foot | .952 |
| Madrid foot | .915 |
| —— vara | 3.263 |
| Malta palm | .915 |
| Moscow foot | .928 |
| Naples palm | .861 |
| —— canna | 6.908 |
| Paris foot | 1.066 |
| Paris metre | 3.281 |
| Rome palm | .733 |
| —— foot | .966 |
| —— deto ($\frac{1}{16}$ foot) | .0604 |
| —— oncio ($\frac{1}{12}$ foot) | .0805 |
| —— palmo | .2515 |
| —— palmo di architettura | .7325 |
| —— canna di architettura | 7.325 |
| —— staiolo | 4.212 |
| —— canna dei mericanti (8 palms) | 6.5365 |
| —— braccio dei mercanti (4 palms) | 2.7876 |
| —— braccio di tessitor di tela | 2.0868 |
| —— braccio di architettura | 2.561 |
| Russian archine | 2.3625 |
| —— arschin | 2.3333 |
| —— verschock, $\frac{1}{16}$ arschin | .1458 |
| Stockholm foot | 1.073 |
| Turin foot | 1.676 |
| —— ras | 1.958 |
| —— trabuco | 10.085 |
| Tyrol foot | 1.096 |
| —— ell | 2.639 |
| Venice foot | 1.137 |
| —— braccio of silk | 2.108 |
| —— ell | 2.089 |
| Venice braccio of cloth | 2.250 |
| Vienna foot | 1.036 |
| —— ell | 2.557 |
| —— post mile | 24888. |
| Warsaw foot | 1.169 |

Measures (Square or Superficial). English square or superficial measures are raised from the yard of 36 inches multiplied into itself, and thus producing 1296 square inches in the square yard: the divisions of this are square feet and inches; and the multiples, poles, roods, and acres, as in the following table:

English Square-Measures.

| Inches | | | | | | |
|---|---|---|---|---|---|---|
| 144 | Foot | | | | | |
| 1296 | 9 | Yard | | | | |
| 3600 | 25 | $2\frac{7}{9}$ | Pace | | | |
| 39204 | $272\frac{1}{4}$ | $30\frac{1}{4}$ | 10.89 | Pole | | |
| 1568160 | 10890 | 1210 | 435.6 | 40 | Rood | |
| 6272640 | 43560 | 4840 | 1743.6 | 160 | 4 | Acre. |

Roman Square-Measure reduced to English.

The integer was the jugerum or acre, which the Romans divided like the libra or as: thus the jugerum contained

| | Square feet. | Scruples. | English roods. | Square poles. | Square feet. |
|---|---|---|---|---|---|
| As | 28800 | 288 | 2 | 18 | 250.05 |
| Deunx | 26400 | 264 | 2 | 10 | 183.85 |
| Dextans | 24000 | 240 | 2 | 2 | 117.64 |
| Dodrans | 21600 | 216 | 1 | 34 | 51.42 |
| Bes | 19200 | 192 | 1 | 25 | 257.46 |
| Septunx | 16800 | 168 | 1 | 17 | 191.25 |
| Semis | 14400 | 144 | 1 | 9 | 125.03 |
| Quincunx | 12000 | 120 | 1 | 1 | 58.82 |
| Triens | 9600 | 96 | 0 | 32 | 264.85 |
| Quadrans | 7200 | 72 | 0 | 24 | 198.64 |
| Sextans | 4800 | 48 | 0 | 16 | 132.43 |
| Uncia | 2400 | 24 | 0 | 8 | 66.21 |

*Note.*—Actus major was 14400 square feet, equal to a semis; clima, 3600 square feet, equal to sescuncia; and actus minimus equal to a sextans.

Measures (Cubical), or Measures of capacity for Liquids. The English measures were originally raised from troy-weight; it being enacted by several statutes that eight pounds troy of wheat, gathered from the middle of the ear, and well dried, should weigh a gallon of wine-measure, the divisions and multiples whereof were to form the other measures; at the same time it was also ordered, that there should be but one liquid measure in the kingdom: yet custom has prevailed, and there having been introduced a new weight, viz. the avoirdupois, we have now a second standard gallon adjusted thereto, and therefore exceeding the former in the proportion of the avoirdupois weight to troy weight. From this latter standard are raised two several measures, the one for ale, the other for beer.

# MEASURES.

The sealed gallon at Guildhall, which is the standard for wines, spirits, oils, &c. is supposed to contain 231 cubic inches, and on this supposition the other measures raised therefrom will contain as in the table underneath; yet, by actual experiment, made in 1688, before the lord-mayor and the commissioners of excise, this gallon was found to contain only 224 cubic inches: it was however agreed to continue the common supposed contents of 231 cubic inches; so that all computations stand on their old footing. Hence, as 12 is to 231, so is $14\frac{12}{20}$ to $281\frac{1}{2}$ the cubic inches in the ale gallon: but in effect the ale quart contains $70\frac{1}{2}$ cubic inches, on which principle the ale and beer gallon will be 282 cubic inches. The several divisions and multiples of these measures, and their proportions, are exhibited in the following tables:

English Measure of Capacity for Liquids

Wine Measure.

| Solid inches | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $28\frac{7}{8}$ | Pint | | | | | | | | |
| 231 | 8 | Gallon | | | | | | | |
| 4158 | 144 | 18 | Runlet | | | | | | |
| $7276\frac{1}{2}$ | 252 | $31\frac{1}{2}$ | $1\frac{3}{4}$ | Barrel | | | | | |
| 9702 | 336 | 42 | $2\frac{1}{3}$ | $1\frac{1}{3}$ | Tierce | | | | |
| 14553 | 504 | 63 | $3\frac{1}{2}$ | 2 | $1\frac{1}{2}$ | Hogshead | | | |
| 19279 | 672 | 84 | $4\frac{2}{3}$ | $2\frac{2}{3}$ | 2 | $1\frac{1}{3}$ | Puncheon | | |
| 29106 | 1008 | 126 | 7 | 4 | 3 | 2 | $1\frac{1}{2}$ | Butt | |
| 58212 | 2016 | 252 | 14 | 8 | 6 | 4 | 3 | 2 | Tun. |

Jewish Measures of Capacity for Liquids, reduced to English Wine-measure.

| | | | | | | | Gall. | pints. | Solid inches. |
|---|---|---|---|---|---|---|---|---|---|
| Caph | | | | | | | 0 | $0\frac{5}{8}$ | 0.177 |
| $1\frac{1}{3}$ | Log | | | | | | 0 | $0\frac{5}{6}$ | 0.211 |
| $5\frac{1}{3}$ | 4 | Cab | | | | | 0 | $3\frac{1}{3}$ | 0.844 |
| 16 | 12 | 3 | Hin | | | | 1 | 2 | 2.533 |
| 32 | 24 | 6 | 2 | Seah | | | 2 | 4 | 5.067 |
| 96 | 72 | 18 | 6 | 3 | Bath, or Epha | | 7 | 4 | 15.2 |
| 960 | 720 | 180 | 60 | 30 | 10 | Coron, or Chomer | 75 | 5 | 7.625 |

Attic Measures of Capacity for Liquids, reduced to English Wine-measure.

| | | | | | | | | | | Gall. | Pints. | Solid inch. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cochliarion | | | | | | | | | | 0 | $\frac{1}{120}$ | 0.0356 | $\frac{5}{12}$ |
| 2 | Cheme | | | | | | | | | 0 | $\frac{1}{60}$ | 0.0712 | $\frac{5}{6}$ |
| $2\frac{1}{2}$ | $1\frac{1}{4}$ | Mystron | | | | | | | | 0 | $\frac{1}{48}$ | 0.089 | $\frac{11}{48}$ |
| 5 | $2\frac{1}{2}$ | 2 | Conche | | | | | | | 0 | $\frac{1}{24}$ | 0.178 | $\frac{1}{24}$ |
| 10 | 5 | 4 | 2 | Cyathos | | | | | | 0 | $1\frac{1}{2}$ | 0.356 | $\frac{11}{12}$ |
| 15 | $7\frac{1}{2}$ | 6 | 3 | $1\frac{1}{2}$ | Oxybaphon | | | | | 0 | $\frac{1}{8}$ | 0.535 | $\frac{3}{8}$ |
| 60 | 30 | 24 | 12 | 6 | 4 | Cotyle | | | | 0 | $\frac{1}{2}$ | 2.141 | $\frac{1}{2}$ |
| 120 | 60 | 48 | 24 | 12 | 8 | 2 | Xestes | | | 0 | 1 | 4.283 | |
| 720 | 360 | 288 | 144 | 72 | 48 | 12 | 6 | Chous | | 0 | 6 | 25.698 | |
| 8640 | 4320 | 3416 | 1728 | 864 | 576 | 144 | 72 | 12 | Metretes | 10 | 2 | 19.629 | |

# MEASURES.

Roman Measures of Capacity for Liquids, reduced to English Wine-measure.

| | | | | | | | | | | Gall. | Pints. | Solid inch. Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ligula | | | | | | | | | | 0 | $0\frac{1}{48}$ | $0.117\frac{5}{12}$ |
| 4 | Cyathus | | | | | | | | | 0 | $0\frac{1}{12}$ | $0.469\frac{2}{3}$ |
| 6 | $1\frac{1}{2}$ | Acetabulum | | | | | | | | 0 | $0\frac{1}{8}$ | $0.704\frac{1}{2}$ |
| 12 | 3 | 2 | Quartarius | | | | | | | 0 | $0\frac{1}{4}$ | 1.409 |
| 24 | 6 | 4 | 2 | Hemina | | | | | | 0 | $0\frac{1}{2}$ | 2.818 |
| 48 | 12 | 8 | 4 | 2 | Sextarius | | | | | 0 | 1 | 5.636 |
| 288 | 72 | 48 | 24 | 12 | 6 | Congius | | | | 0 | 7 | 4.942 |
| 1152 | 288 | 192 | 96 | 48 | 24 | 4 | Urna | | | 3 | $4\frac{1}{2}$ | 5.33 |
| 2304 | 576 | 384 | 192 | 96 | 48 | 8 | 2 | Amphora | | 7 | 1 | 10.66 |
| 46080 | 11520 | 7680 | 3840 | 1920 | 960 | 160 | 40 | 20 | Culeus | 143 | 3 | 11.095 |

Beer and Ale Measure.

| | | | | | |
|---|---|---|---|---|---|
| Pints | | | | | |
| 8 | Gallon | | | | |
| 72 | 9 | Firkin | | | |
| 144 | 18 | 2 | Kilderkin | | |
| 288 | 36 | 4 | 2 | Barrel | |
| 576 | 72 | 8 | 4 | 2 | Hogshead. |

English Dry or Corn Measure.

| | | | | | |
|---|---|---|---|---|---|
| Solid inches | | | | | |
| 33.6 | Pint | | | | |
| 268.8 | 8 | Gallon | | | |
| 537.6 | 16 | 2 | Peck | | |
| 2150.4 | 64 | 8 | 4 | Bushel | |
| 17203.2 | 512 | 64 | 32 | 8 | Quarter. |

Scripture Measures of Capacity for things dry, reduced to English Corn-measure.

| | | | | | | | Peck. | Gall. | Pint. | Solid inch. Dec. |
|---|---|---|---|---|---|---|---|---|---|---|
| Gachal | | | | | | | 0 | 0 | $0\frac{17}{120}$ | 0.031 |
| 20 | Cab | | | | | | 0 | 0 | $2\frac{5}{6}$ | 0.073 |
| 36 | $1\frac{4}{5}$ | Gomor | | | | | 0 | 0 | $5\frac{1}{10}$ | 1.211 |
| 120 | 6 | $3\frac{1}{3}$ | Seah | | | | 1 | 0 | 1 | 4.036 |
| 360 | 18 | 10 | 3 | Epha | | | 3 | 0 | 3 | 12.107 |
| 1800 | 90 | 50 | 15 | 5 | Leteeh | | 16 | 0 | 0 | 26.500 |
| 3600 | 180 | 100 | 30 | 10 | 2 | Chomer, or Coron | 32 | 0 | 1 | 18.969 |

Attic Measures of Capacity for things dry, reduced to English Corn measure.

| | | | | | | | Peck. | Gal. | Pint. | Solid inch. Dec. |
|---|---|---|---|---|---|---|---|---|---|---|
| Cochliarion | | | | | | | 0 | 0 | 0 | $0.276\frac{7}{20}$ |
| 10 | Cyathos | | | | | | 0 | 0 | 0 | $2.763\frac{1}{2}$ |
| 15 | $1\frac{1}{2}$ | Oxybaphon | | | | | 0 | 0 | 0 | $4.144\frac{3}{4}$ |
| 60 | 6 | 4 | Cotyle | | | | 0 | 0 | 0 | 16.579 |
| 120 | 12 | 8 | 2 | Xestes | | | 0 | 0 | 0 | 33.158 |
| 180 | 18 | 12 | 3 | $1\frac{1}{2}$ | Choenix | | 0 | 0 | 1 | $15.705\frac{3}{4}$ |
| 8640 | 864 | 576 | 144 | 72 | 48 | Medimnos | 4 | 0 | 6 | 3.501 |

Roman Measure of Capacity for things dry, reduced to English Corn-measure.

| | | | | | | | Peck. | Gal. | Pint. | Solid inch. Dec. |
|---|---|---|---|---|---|---|---|---|---|---|
| Ligula | | | | | | | 0 | 0 | $0\frac{1}{48}$ | 0.01 |
| 4 | Cyathus | | | | | | 0 | 0 | $0\frac{1}{12}$ | 0.04 |
| 6 | $1\frac{1}{2}$ | Acetabulum | | | | | 0 | 0 | $0\frac{1}{8}$ | 0.06 |
| 24 | 6 | 4 | Hemina | | | | 0 | 0 | $0\frac{1}{2}$ | 0.24 |
| 48 | 12 | 8 | 2 | Sextarius | | | 0 | 0 | 1 | 0.48 |
| 384 | 96 | 64 | 16 | 8 | Semimodius | | 0 | 1 | 0 | 3.84 |
| 768 | 192 | 128 | 32 | 16 | 2 | Modius | 1 | 0 | 0 | 7.68 |

Measure is also used to signify the cadence and time observed in poetry, dancing, and music, to render them regular and agreeable. The different measures or metres in poetry are the different manners of ordering and combining the quantities, or the long and short syllables. Thus hexameter, pentameter, iambic, sapphic verses, &c. consist of different measures.

In English verses, the measures are extremely various and arbitrary, every poet being at liberty to introduce any new form that he pleases. The most usual are the heroic, generally consisting of five long and five short syllables; and verses of four feet; and of three feet and a cæsura, or single syllable.

The ancients, by variously combining and transposing their quantities, made a vast variety of different measures. Of words, or rather feet of two syllables, they formed a spondee, consisting of two long syllables; a pyrrhic, of two short syllables; a trochee, of a long and a short syllable; and an iambic, of a short and a long syllable. Of their feet of three syllables they formed a molossus, consisting of three long syllables; a tribrach, of three short syllables; a dactyl, of one long and two short syllables; and an anapæst, of two short and one long syllable. The Greek poets contrived 124 different combinations or measures, under as many different names, from feet of two syllables to those of six.

Measure, in music, the interval or space of time which the person who beats time takes between the raising and falling of his hand or foot, in order to conduct the movement, sometimes quicker and sometimes slower, according to the kind of music, or the subject that is sung or played. The measure is that which regulates the time we are to dwell on each note. See Time. The ordinary or common measure is one second or 60th part of a minute, which is nearly the space between the beats of the pulse or heart; the systole, or contraction of the heart, answering to the elevation of the hand; and its diastole, or dilatation, to the letting it fall. The measure usually takes up the space that a pendulum of two feet and a half long employs in making a swing or vibration. The measure is regulated according to the different quality or value of the notes in the piece; by which the time that each note is to take up is expressed. The semibreve, for instance, holds one rise and one fall; and this is called the measure, or whole measure; sometimes the measure-note, or time-note; the minim, one rise or one fall; and the crotchet, half a rise or half a fall, there being four crotchets in a full measure.

Measure (Binary or Double), is that wherein the rise and fall of the hand are equal.

Measure (Ternary or Triple), is that wherein the fall is double to the rise, or where two minims or crotchets are played during a fall, and but one in the rise.

Measure (Universal or Perpetual), is a kind of measure unalterable by time or place, to which the measures of different ages and nations might be reduced, and by which they may be compared and estimated. Such a measure would be very useful, if it could be attained; since, being used at all times, and in all places, a great deal of confusion and error would be avoided.

The theories of eminent men on this subject are useful, and deserve attention, as they may suggest improvements of great importance. Huygens proposed the length of a pendulum that should vibrate seconds, to be measured from the point of suspension to that of oscillation. The third part of this pendulum he termed a horary foot, and such he recommended should be the standard by which the measure of every foot in Europe might be regulated. Admitting his plan to be worthy of adoption, and an experiment made, it appears that the Paris foot would bear a proportion to the horary foot of 864 to 881, which is demonstrated in this manner: the length of three Paris feet is 864 half lines, and that of a pendulum vibrating seconds consists of 881 half lines. The principal objection to this ingenious suggestion of Huygen is founded on the assumption that the action of gravity is the same in all parts of the globe, which is certainly not the case; consequently, instead of its serving universally, it would be useful only in those places which lie under the same parallel of latitude. Thus, if each different latitude had its foot equal to the proposed third part of the pendulum vibrating seconds there, any given latitude must have a different length for the foot. Exclusive of this objection, there would be a second proceeding from the difficulty attending the exact measurement between the centres of motion and oscillation, which is such, that it is highly probable no two persons would agree in their accounts of the space.

Many attempts and expedients were suggested after the rejection of the above plan, with similar want of success. This circumstance did not escape the notice of the Society for the Encouragement of Arts, Manufactures, and Commerce, the officers of which, with a commendable zeal, advertised a premium of one hundred guineas, or a gold medal, as a reward to those who would propose the approved means "for obtaining invariable standards for weights and measures, communicable at all times and to all nations." This invitation procured a communication from Mr. Hatton, in 1779, in which he proposed the application of a moveable

point of suspension to one and the same pendulum, and by this means he intended to accomplish the full effect of two, the difference in the lengths of which was the desired measure.

The ideas of Mr. Hatton were approved by the ingenious Whitehurst, who improved upon them, and invented some very curious and excellent machinery; besides which, he published, eight years after, a work entitled An Attempt towards obtaining invariable Measures of Length, Capacity, and Weight, from the Mensuration of Time, &c. Mr. Whitehurst thought it convenient and proper for attaining this most desirable end, to endeavour to obtain a measure of the greatest convenient length from two pendulums, the vibrations of which are in the ratio of two to one, and of lengths agreeing with the English standard in whole numbers.

To explain our philosopher's intentions more fully, let us admit the supposition that the length of a pendulum vibrating seconds in the latitude of London is 39.2 inches; the length of one vibrating 42 times in a minute amounts to 80 inches; by the same unerring rule, another vibrating 84 times in a minute must be 20 inches: the difference resulting from these data is 60 inches and his proposed standard measure. Pursuing his experiments to the very acme of perfection, he found the variation in the length of the two pendulums to be 59.892 inches, instead of 60, arising from an error in the assumed length of the seconds' pendulum.

It is generally admitted, that Mr. Whitehurst has succeeded in his design, and demonstrated to the learned how an invariable standard may at any time be found for the same latitude. Besides this discovery, the world is indebted to him for the accurate ascertaining of a fact of very considerable importance in natural philosophy. A person who wrote with ability on this point observes, with respect to the fact just mentioned, "The difference between the lengths of the rods of two pendulums, whose vibrations are known, is a datum from which may be derived the true lengths of pendulums, the spaces through which heavy bodies fall in a given time, with many other particulars relative to the doctrine of gravitation, the figure of the earth," &c. Mr. Whitehurst perceived from this experiment, that the length of a seconds' pendulum vibrating in a circular arc of 3° 20′, is very nearly 39.119; but performing the same motion in the arc of a cycloid, the result would be 39.136 inches; consequently, weighty substances will descend in the first second after they are detached from their support nearly 16.094 feet, or 16.1$\frac{1}{8}$ inch.

Dr. Young, to whom we acknowledge ourselves indebted for many of the following particulars, has given an excellent compressed table of measures and standards, in his recent valuable work, A Course of Lectures on Natural Philosophy, &c. from which we find, that the English yard is said to have been derived from the length of the arm of Henry I. in the year 1101; that Graham asserts the length of the pendulum vibrating seconds accurately is equal to 39.13 inches; that Bird's parliamentary standard is admitted to be of the greatest authority, and that it agrees nearly with the scales of Shuckburgh and Pictet, made by Troughton. The standard of the Royal Society by Graham exceeds that of Bird's in length about 1000th part of an inch, but it is not quite uniform throughout its length. The standard in the Exchequer is about .0075 inch shorter than the yard of the Royal Society. General Roy used a scale of Sisson, divided by Bird, and found it to agree exactly with the Tower standard on the Royal Society's scale. Sir George Shuckburgh, adopting Troughton's scales for the standard, found the original Tower standard 36.004; the yard E. on the Royal Society's scale by Graham 36.0013 inches; the yard Exchequer of the same scale 35.9933; Roy's scale 36.0036; the Royal Society's scale by Bird 35.99955; Bird's parliamentary standard of 1758, 36.00023. The English have employed and adjusted their standards at the temperature of 62° of Fahrenheit's thermometer, and the French at the freezing point of water. The French metre is 39.37100 English inches, and the ten millionth part of the quadrant of the meridian. The same measure contains 36.9413 French inches, or 3 feet 11.296 lines. Hence, says the doctor, the French toise of 72 inches is equal to 76.736 English inches. One of Lalande's standards measured by Dr. Maskelyne was 76.732, the other 76.736. In latitude 45°, a pendulum of the length of a metre would perform in a vacuum 86116.5 vibrations in a day. The length of the second pendulum is 993827 at Paris.

The French National Institute of Sciences and Arts have turned their attention to this subject, and in the month of Nivose, in the year 1801, a member read a report from a committee, founded on the comparison of the standard metre of the Institute with the English foot. And M. Pictet, professor of natural philosophy at Geneva, exhibited to the class, in the month of Vendemiaire, a collection of the most interesting objects, which he had collected in England, relating to arts and sciences. One of the number was a standard of the English linear measure, which was of brass, 49 inches in length, and neatly divided by engraved lines into tenths of an inch. This standard was made for the exhibitor by Troughton, a resident in London, who has deservedly acquired the reputation of dividing instruments with the utmost accuracy; which was compared with another made by the same artist for sir George Shuckburgh, when it was ascertained satisfactorily, that the variations between them did not amount to more than the difference between the divisions of each; in other words, the variation was almost imperceptible. Arguing from this circumstance, the standard may be considered as identical with that described by sir George Shuckburgh in the Philosophical Transactions for 1798.

Another excellent instrument, constructed by Mr. Troughton, and shewn at the same time by M. Pictet, was a comparer, calculated to ascertain minute variations between measures. This instrument "consists of two microscopes, with cross wires, placed in a vertical situation, the surface of the scale being horizontal, and fixed at proper distances upon a metallic rod. One of them remains stationary at one end of the scale, the other is occasionally fixed near to the other end; and its cross wires are moveable by means of a screw, describing in its revolution 1-hundredth of an inch, and furnished with a circular index, dividing each turn into 100 parts; so that having two lengths, which differ only one-tenth of an inch from each other, we may determine their difference in 10-thousandths of an inch. The wires are placed obliquely with respect to the scale, so that the line of division must bisect the acute angle which they form, in order to coincide with their intersection." An instrument similar to that thus described, and made by Ramsden, for measuring the expansion of metals, was described by general Roy in the seventy-fifth vol. of the Royal Transactions.

M. Pictet, influenced by a desire of advancing science, made an offer to the class of the use of the

standard and the micrometer for the purpose of determining the comparative length of the metre and the English foot: the offer was gratefully accepted by the Society, and Messrs. Legendre, Mechain, and Prony, were appointed to assist M. Pictet in making the proposed comparison of their standard metre of platina and the measure just mentioned. The first assembling of this committee was on the 21st of October, of the same year, at the mansion of M. Lenoir. Upon commencing their operations, they found some difficulty arising from the different manner in which the measures were defined: the French standards were merely cut off to the length of a metre; but the English scale was graduated by lines; consequently the length of the former could not readily be taken by the microscopes, neither could the English scale be measured by the usual method adopted for making new standard metres, which is accomplished by fixing one extremity against a firm support, "and bringing the other into contact with the face of a cock, or slider, adjusted so as barely to admit the original standard between it and the fixed surface."

M. Lenoir endeavoured to remove this unfortunate impediment, by taking a piece of brass of the length of a metre, and reducing the terminations to a thin edge, which was compared by the committee with the standard metre as usual; when placed on the English scale the extremities of the brass made two parallel lines to those engraved on the scale, and thus the apparatus was capable of being seen through the microscope: by these means the standard metre of platina, and another belonging to the Institute, made of iron, were compared with the English foot; the two measures each being equal, at the temperature of melting ice, to the ten millionth part of the quadrant of the meridian. "At the temperature of 15.3° of the decimal thermometer, or 59.5° of Fahrenheit, the metre of platina was equal to 39.3775 English inches, and that of iron to 39.3788, measured on M. Pictet's scale."

It was discovered, however, that the manner employed produced results not quite satisfactory, as an uncertainty occurred through the difficulty of placing the cross wires exactly at the extreme of the brass plate, where a reflection of light took place which precluded a distinct observation whether the optical axis of the microscope was decidedly a tangent to the surface precisely at the termination. M. Prony, a member of the committee, suggested another arrangement as a remedy for this obstacle, and M. Paul, of Geneva, who was present, carried it into execution: this latter gentleman traced a perpendicular line to its length, on a small metallic ruler, the end of which he placed against a firm resistance, and the cross wires were made to agree with the line; they then interposed the standard metre between the end of the piece and the resisting substance, "and the line traced on it, which had now obviously advanced the length of the metre, was subjected to the other microscope. The microscopes thus fixed were transferred to the graduated scale: one of them was placed exactly over one of the divisions, and the micrometer screw was turned in order to measure the fraction, expressing the distance of the other microscope from another division."

A second comparison took place on the 26th of October, at the residence of a member of the committee; and after several satisfactory experiments, it was discovered, that at the temperature 12.75°, or 55 of Fahrenheit, the standard of platina was 39.3781, and that of iron 39.3795 English inches. The different metres being intended to be equal at the temperature of melting ice, the preceding experiments may be tried by bringing their results to the same temperature. To determine this, we have Borda's accurate trials, and the report of the committee of weights and measures on the dilatation of platina, brass, and iron, whence it appears, "that for each degree of the decimal thermometer, platina expands .00000856; iron, 00001156; and brass, 00001783: for Fahrenheit's scale these quantities become 476; 642, and 990 parts in a hundred millions. From these data we find, that, at the freezing point, the standard metre of platina was equal to 39.38280, and that of iron to 39.38265 English inches of M. Pictet's scale. The difference is less than the 500th of a line, or the 200,000th of the whole metre."

The facts obtained by all the comparisons amount to this conclusion, taking each of the measures at the temperature of melting ice, the individual standard metres are equal to the 10,000,000th part of the quadrant of the meridian, and to 39.38272 English inches of M. Pictet's scale.

ME'ASURELESS. *a.* (from *measure.*) Immense; immeasurable (*Shakspeare*).

ME'ASUREMENT. *s.* (from *measure.*) Mensuration; act of measuring.

ME'ASURER. *s.* One that measures.

MEAT. *s.* (*met*, French.) 1. Flesh to be eaten (*Bacon*). 2. Food in general (*Shaks.*)

ME'ATED. *a.* (from *meat.*) Fed; foddered.

MEATH, or East Meath, a county of Ireland, in the province of Leinster, bounded on the north by the counties of Cavan and Monaghan, on the north-east by Louth, on the east by the Irish sea, on the south-east by Dublin, on the south by Kildare, and on the west by West Meath; thirty miles from north to south, and from twenty-five to thirty-five east to west. It contains 147 parishes, about 22,468 houses, and 112,400 souls. The soil of Meath is various, but generally rich, and a few coarse hills, with very little waste land: the bogs are neither numerous nor extensive; consequently, fuel is scarce and dear. Much coarse linen is made in this county, but its principal sources of wealth are derived from the flocks and herds that are fattened, and the abundance of corn that is raised on its fruitful plains. Trim is the county town. Several small bishoprics were gradually united into one see, and received the name of Meath in the 12th century. There is no cathedral, and the episcopal palace is at a village called Ardbraccan, near the town of Navan.

Meath (West), a county of Ireland, in the province of Leinster; bounded on the north by Cavan, on the north-east and east by East Meath, on the south by King's county, on the west by Roscommon, from which it is separated by the Shannon, and on the north-west by Longford. It is one of the most populous and fertile counties in Ireland, contains 62 parishes, and sends 10 members to parliament. Mullenger is the county town.

MEATUS AUDITORIUS, the external passage to the drum of the ear. See Anatomy and Ear.

MEAUX, an ancient town of France, in the

department of Seine and Marne, with a bishop's see. It is large and populous; and the market-place is a peninsula, contiguous to the town, which was formerly well fortified, and, in 1421, stood a siege of three months against the English. It is seated on the Marne, 10 miles N.W. of Colomiers, and 25 N.E. of Paris. Lon. 2. 58 E. Lat. 48. 58 N.

MECAN, a large river, which rises in Thibet, and flowing S.E. through Laos and Cambodia, falls by two mouths into the China sea, forming an island below the city of Cambodia, which here gives name to the eastern branch.

MECÆNAS, or MECŒNAS (C. Cilnius), a celebrated Roman knight, descended from the kings of Etruria. He has rendered himself immortal by his liberal patronage of learned men and of letters; and to his prudence and advice Augustus acknowledged himself indebted for the security he enjoyed. His fondness for pleasure removed him from the reach of ambition; and he preferred dying, as he was born, a Roman knight, to all the honours and dignities which either the friendship of Augustus or his own popularity could heap upon him. To the interference of Mecænas, Virgil owed the retribution of his lands: and Horace was proud to boast that his learned friend had obtained his forgiveness from the emperor for joining the cause of Brutus at the battle of Philippi. Mecænas was himself fond of literature; and, according to the most received opinion, he wrote a history of animals, a journal of the life of Augustus, a treatise on the different natures and kinds of precious stones, besides the two tragedies of Octavia and Prometheus, and other things, all now lost. He died eight years before Christ; and on his death-bed he particularly recommended his poetical friend Horace to the care and confidence of Augustus. Seneca, who has liberally commended the genius and abilities of Mecænas, has not withheld his censure from his dissipation, indolence, and effeminate luxury. From the patronage and encouragement which the princes of heroic and lyric poetry among the Latins received from the favourite of Augustus, all patrons of literature have ever since been called Mecænates. Virgil dedicated to him his Georgics, and Horace his Odes.

MECCA, an ancient and famous town of Arabia Deserta, seated in a barren valley, surrounded by many little hills, consisting of a blackish rock. The buildings are very mean, and its support is the annual resort of pilgrims at a certain season of the year; for, at other times, the shops are scarcely open. On the top of one of the hills is a cave, where they pretend Mahomet usually retired to perform his devotions; and hither, they affirm, the greatest part of the Koran was brought him by the angel Gabriel. The town has plenty of water, and yet little garden-stuff; but there are several sorts of good fruit, as grapes, melons, water-melons, and cucumbers. Numbers of sheep are brought hither to be sold to the pilgrims. The temple of Mecca has 42 doors, and its form resembles the Royal Exchange in London, but it is near ten times as large. It is open in the middle, and the ground covered with gravel, except in two or three places that lead to the Beat-Allah through certain doors; and these are paved with short stones. There are cloisters all round, and in the sides are cells for those that live a monastic life. The Beat-Allah, in the middle of the temple, is a square structure, each side about 20 paces long, and 24 feet high; covered all over from top to bottom with a thick sort of silk, and the middle embroidered with large letters of gold: the door is covered with silver plates, and has a curtain before it, thick with gold embroidery. This Beat is the principal object of the pilgrims devotion, and is open but two days in the space of six weeks, one day for the men, and the next for the women. Within there are only two wooden pillars in the middle to support the roof, with a bar of iron fastened thereto, on which hang three or four silver lamps: the walls are marble, and covered with silk, unless when the pilgrims enter. About 12 paces from the Beat is the sepulchre of Abraham, as they pretend; and they affirm that he erected the Beat-Allah. When the pilgrims have performed their devotions here, they repair to a hill, which, however, is not large enough to contain them all at once, for there are no less than 70,000 pilgrims every year. When certain ceremonies are over, they receive the title of hadgies or saints; and the next morning they move to a place about two miles from Mecca, where they say Abraham went to offer up his son Isaac. Here they pitch their tents, and then throw seven small stones against a little square stone building. This, they affirm, is performed in defiance of the devil. Every one that purchases a sheep, eating some of it themselves, and giving the rest to poor people who attend upon that occasion. Mecca is 34 miles N.E. of Judda, the seaport of Mecca, and 220 S. by E. of Medina. Lon. 40. 55 E. Lat. 21. 45 N.

MECHADEB, a town of Arabia Felix, in the province of Yemen, 72 miles S. of Sanaa. Lon. 44. 15 E. Lat. 14. 7 N.

MECHANICAL, an epithet applied to whatever relates to mechanics; thus we say mechanical powers, causes, &c. See the articles POWER, CAUSE, &c. The mechanical philosophy is the same with what is otherwise called corpuscular philosophy. See CORPUSCULAR. This manner of reasoning, formerly much used in medicine is described by Dr. Quincy as the result of a thorough acquaintance with the structure of animal bodies: for, considering an animal body as a composition out of the same matter from which all other bodies are formed, and to have all those properties which concern a physician's regard, only by virtue of its peculiar construction; it naturally leads a person to consider the several parts, according to their figures, contexture, and use, either as wheels, pulleys, wedges, levers, screws, cords, canals, strainers, &c. For which purpose, continues he, it is frequently found help-

ful to design in diagrams, whatsoever of that kind is under consideration, as is customary in geometrical demonstrations.

Mechanical, in mathematics, denotes a construction of some problem as the duplicature of the cube and quadrature of the circle, by the assistance of instruments, in contradistinction to that which is done in an accurate and geometrical manner.

Mechanical curve, is a curve, according to Descartes, which cannot be defined by any algebraic equation; and so stands contradistinguished from algebraic or geometrical curves. Leibnitz and others call these mechanical curves transcendental, and dissent from Descartes, in excluding them out of geometry. Leibnitz found a new kind of transcendental equations, whereby these curves are defined: but they do not continue constantly the same in all points of the curve, as algebraic ones do. See the article Transcendental.

MECHANICS, that branch of practical mathematics which considers motion and moving powers, their nature and laws, with their effects in machines.

The term mechanics is equally applied to the doctrine of the equilibrium of powers, more properly called statics; and to that science which treats of the generation and communication of motion, which constitutes dynamics, or mechanics strictly so called. See Statics, Power, Motion, Dynamics, &c.

The knowledge of mechanics is one of those things, says Mr. Mac Laurin, that serve to distinguish civilized nations from barbarians. It is by this science that the utmost improvement is made of every power and force in nature; and the motions of the elements, water, air, and fire, are made subservient to the various purposes of life; for however, weak the force of man appears to be, when unassisted by this art; yet, with its aid, there is hardly any thing above his reach. It is distinguished by sir Isaac Newton into practical and rational mechanics; the former of which treats of the mechanical powers, viz. the lever, balance, axis and wheel, pulley, wedge, screw, and inclined plane.

Rational mechanics comprehends the whole theory of motion, shews when the powers or forces are given how to determine the motions that are produced by them; and conversely when the phænomena of the motions are given, how to trace the powers or forces from which they arise.

The Greeks, from whom we have borrowed the term, gave it a much more limited meaning; confining it to those motions which are produced by the intervention of machines. Even many of the naturalists of the present day limit the term to those motions which are the immediate consequences of impulse, and which are cases of sensible motion. Thus the chemist says, that printers ink is a mechanical fluid, but that ink for writing is a chemical fluid. We make no objection to the distinction, because chemistry is really a vast body of real and important science, although we have, as yet, been able to class only very complicated phenomena, and are far from the knowledge of its elements. This distinction made by the chemists is very clear, and very proper to be kept in view; but we should be at a loss for a term to express the analogy which is perceivable between these sensible motions and the hidden motions which obtain even in the chemical phenomena, unless we give mechanism a still greater extension than the effects of percussion or impulsion.

Mechanics, in the ancient sense of the word, considers only the energy of *organa*, machines. The authors who have treated the subject systematically have observed, that all machines derive their efficacy from a few simple forms and dispositions, which may be given to that piece of matter called the *tool*, 'Οργανον, or *machine*, which is interposed between the workman or natural agent, and the task to be performed, which is always something to be moved, in opposition to resisting pressures. To those simple forms they have given the name of mechanical powers, simple powers, simple machines.

The machine is interposed for various reasons.

1. In order to enable a natural power, having a certain determinate intensity, which cannot be increased, to balance or overcome another natural power, acting with a greater intensity. For this purpose, a piece of solid matter is interposed, connected in such a manner with firm supports, that the pressure exerted on the impelled point by the power occasions the excitement of a pressure at the working point, which is equal or superior to the resistance, arising from the work, to the motion of that point. Thus, if a rod three feet long be supported at one foot from the end to which the resistance of two pounds is applied, and if a pressure of one pound be applied to the other end of the rod, perpendicular to its length, the cohesive forces which connect the particles of the rod will all be excited, in certain proportions, according to their situation, and the supported point will be made to press on its support as much as three pounds would press on it; and a pressure in the opposite direction will be excited at the working point, equal to the pressure of two pounds. The resistance will therefore be balanced, and it will be overcome by increasing the natural power acting on the long division of the rod. This is called a lever. Toothed wheels and pinions are a perpetual succession of levers in one machine or mechanical power.

Many of the instruments in common use are levers of one of the three kinds; thus, pincers, sheers, forceps, snuffers, and such like, are compounded of two levers of the first kind; for the joint about which they move is the fulcrum, or centre of motion; the power is applied to the handles, to press them together; and the weight is the body which they pinch or cut. The cutting knives used by druggists, patten-makers, block-makers, and some other trades, are levers of the 2d kind: for the knife is fixed by a ring at one end, which makes the fulcrum,

or fixed point; the other end is moved by the hand, or power; and the body to be cut, or the resistance to be overcome, is the weight. Doors are levers of the 2d kind; the hinges being the centre of motion; the hand applied to the lock is the power; while the door or weight lies between them. A pair of bellows consists of two levers of the 2d kind; the centre of motion is where the ends of the boards are fixed near the pipe; the power is applied at the handles; and the air pressed out from between the boards, by its resistance, acts against the middle of the boards like a weight. The oars of a boat are levers of the 2d kind: the fixed point is the blade of the oar in the water; the power is the hand acting at the other end; and the weight to be moved is the boat. And the same of the rudder of a vessel. Spring sheers and tongs are levers of the 3d kind; where the centre of the motion is at the bow-spring at one end; the weight or resistance is acted on by the other end; and the hand or power is applied between the ends. A ladder reared by a man against a wall, is a lever of the 3d kind: and so are also almost all the bones and muscles of animals.

In all levers, the effect of any power or weight, is both proportional to that power or weight, and also to its distance from the centre of motion. And hence it is that, in raising great weights by a lever, we choose the longest levers; and also rest it upon a point as far from the hand or power, and as near to the weight, as possible. Hence also there will be an equilibrium between the power and weight, when those two products are equal, viz. the power multiplied by its distance, equal to the weight multiplied by its distance; when, also, the weight and power are to each other reciprocally as their distances from the prop or fixed point.

2. The natural power may act with a certain velocity which cannot be changed, and the work requires to be performed with a greater velocity. A machine is interposed, moveable round a fixed support, and the distances of the impelled and working points are taken in the proportion of the two velocities. Then are we certain, that when the power acts with its natural velocity, the working point is moving with the velocity we desire.

3. The power may act only in one unchangeable direction, and the resistance must be overcome in another direction. As when a quantity of coals must be brought from the bottom of a pit, and we have no power at command but the weight of a quantity of water. We let the water pull down one end of a lever, either immediately or by a rope, and we hang the coals on the other end, while the middle point is firmly supported. This lever may be made perpetual, by wrapping the ropes round a cylinder which turns round an axis firmly supported. This is a fixed pulley. We can set unequal powers in opposition, by lapping each rope round a different cylinder, having the same axis. This is a windlass or gin. All these forms derive their energy from the lever virtually contained in them.

Thus, in the axis-in-peritrochio, the centre of the axis, or wheel, is the fixed point; the radius of the wheel is the distance of the power acting at the circumference of the wheel, from, that point; and the radius of the axle is the distance of the weight from the same point. Hence the effect of the power, independent of its own natural intensity, is as the radius of the wheel; and the effect of the weight is as the radius of the axle; so that the two will be in equilibrio, when the two products are equal, which are made by multiplying each of these, the weight and power, by the radius, or distance at which it acts; and then also, the weight and power are reciprocally proportional to those radii.

In practice, the thickness of the rope, that winds upon the axle, and to which the weight is fastened, is to be considered: which is done, by adding half its thickness to the radius of the axis, for its distance from the fixed point, when there is only one fold of rope upon the axle; or as many times the thickness as there are folds, wanting only one half when there are several folds of the rope, one over another: which is the reason that more power must be applied when the axis is thus thickened; as often happens in drawing water from a deep and narrow well, over which a long axle cannot be placed.

If the rope to which the power is fastened be successively applied to different wheels, whose diameters are larger and larger; the axis will be turned with still more and more ease, unless the intensity of the power be diminished in the same proportion; and if so, the axis will always be drawn with the same strength by a power continually diminishing. This is practised in spring clocks and watches; where the spiral spring, which is strongest in its action when first wound up, draws the fuzee, or continued axis-in-peritrochio, first by the smaller wheels, and as it unbends and becomes weak, draws at the larger wheels, in such manner that the watch work is always carried round with the same force.

Any of the three purposes above-mentioned may be gained by the interposition of a solid body in another way. Instead of being supported in one point, round which it is moveable, it may be supported by a solid path, along which it is impelled, and by its shape it thrusts the resisting body out of its way. This is the case with the wedge when it is employed to force up a swagging joist, or press things strongly together. If this wedge be wrapped or formed round an axis, it becomes a screw or a spiral wiper. This is also the operation of the balance wheel of a horizontal or cylinder watch. The oblique face of the tooth is a wedge, which thrusts the edge of the cylinder out of its way. The pallet of a clock or watch is also a wedge, acted on in the opposite direction.

These are the different forms in which a solid body is interposed as a mechanic power. All are reducible to the lever and the wedge.

In the screw, and the wedge, the power has to overcome both the weight, and also a very great friction in those machines; such indeed as amounts sometimes to as much as the weight

to be raised, or more. But then this friction is of use in retaining the weight and machine in its place, even after the power is taken off.

There are other mechanic powers besides those now mentioned. The carmen have a way of lowering a cask of liquor into a cellar, by passing a rope under it, making the end fast to some stake close to the ground, and bringing the other end of the rope round the cask, and thus letting it slip down in the bight of the rope. In this process they feel but half of its weight, the other half being supported by the end of the rope that is fastened to the stake. This is called a parbuckle by the seamen. A hanging pulley is quite the same with this more artless method. The weight hangs by the axis of the pulley, and each half of the hanging rope carries half of the weight, and the person who pulls one of them upwards acts only against half of the weight, the other being carried by the hook to which the standing rope is fastened. This mechanical power does not (as is commonly imagined) derive its efficacy from the pulley's turning round an axis. If it were made fast, or if the tackle rope merely passed through a loop of the rope which carries the weight, it would still require only half of the weight acting on the running rope to balance it. The use of the motion round an axis is merely to avoid a very great friction. When the two hanging parts of the rope are not parallel, but inclined in any angle, the force necessary for balancing the weight is to the weight as the side is to the diagonal of the parallelogram formed by the directions of the three ropes. Varignon calls this the funicular machine or power. Our sailors call it the swigg.

We may employ the *quaqua versum* pressure of fluidity with great effect as a mechanic power. Thus, in the hydrostatic bellows described by Gravesande, § 1451, and by Desaguiers, the weight of a few ounces of water is made to raise several hundred pounds. In like manner, Dr. Wallis of Oxford, by blowing with a pipe into a bladder, raised 64 pounds lying on it. Otto Guericke of Magdeburgh made a child balance, and even overcome, the pull exerted by the emperor's six coach horses, by merely sucking the air from below a piston. Mr. Bramah, ironmonger in Piccadilly, London, has lately obtained a patent for a machine acting on this principle as a press. A piston of one-fourth of an inch in diameter forces water into a cylinder of 12 inches diameter, and by this intervention raises the piston of the cylinder. A boy, acting with the fourth part of his strength on the small piston by means of a lever, raises 42 tons, or 94,080 libs, pressing on the great piston. It is very surprising, that this application of the *quaqua versum* pressure of fluids has been overlooked for more than a century, although the principle has been inculcated and lectured on by every itinerant teacher, and illustrated by the above-mentioned experiments of Gravesande and Wallis.

Some of the principles of statics were established by Archimedes, in his treatise on the Centre of Gravity of Plane Figures: besides which, little more upon mechanics is to be found in the writings of the ancients, except what is contained in the 8th book of Pappus's Mathematical Collections, concerning the five mechanical powers. Galileo laid the best foundation of mechanics, when he investigated the descent of heavy bodies; and since his time, by the assistance of the new methods of computation, a great progress has been made, especially by Newton, in his Principia, which is a general treatise on Rational and Physical Mechanics, in its largest extent. Other writers on this science, or some branch of it, are, Guido Ubaldus, in his Liber Mechanicorum Torricelli, Libri de Motu Gravium naturaliter Descendentium et Projectorum; Balianus, Tractatus de Motu naturali Gravium; Huygens, Horologium Oscillatorium, and Tractatus de Motu Corporum ex Percussione; Leibnitz, Resistentia Solidorum in Acta Eruditor, an. 1684; Guldinus, De Centro Gravitatis; Wallis, Tractatus de Mechanica; Varignon, Projet d'une Nouvelle Mechanique, and his papers in the Memoir. Acad. an. 1702; Borelli, Tractatus De Vi Percussionis, De Motionibus Naturalibus a Gravitate pendentibus, and De Motu Animalium; De Chales, treatise on Motion; Pardies, Discourse of Local Motion; Parent, Elements of Mechanics and Physics; Casatus, Mechanica; Oughtred, Mechanical Institutions; Rohault, Tractatus de Mechanica; Lamy, Mechanique; Keill, Introduction to true Philosophy; De la Hire, Mechanique; Mariotte, Traité du Choc des Corps; Ditton, Laws of Motion; Herman, Phoronomia; Gravesande, Physics; Euler, Tractatus de Motu; Musschenbroek, Physics; Bossu, Mechanique; Desaguliers, Mechanics; Rowning, Natural Philosophy; Emerson, Mechanics; Parkinson, Mechanics; La Grange, Mechanique Analytique; Nicholson, Introduction to Natural Philosophy; Enfield, Institutes of Natural Philosophy; Wood, Mechanics; Atwood, on Motion; Gregory, Mechanics in Theory and Practice; Francear, Mecanique; Prony, Architecture Hydraulique, and Mecanique Analitique; and lastly, a very neat Introduction to the Theory of Mechanics, just published by Mr. Marat of Boston. As to the description of machines, see Strada, Zeisingius, Besson, Augustine de Ramellis, Boetler, Leopold, Sturmy, Perrault, Limberg, Emerson, Royal Academy of Sciences, Prony, Bailey, Brewster, Gregory, Transactions, Society of Arts, Repertory of Arts, &c.

MECHA'NICALLY. *ad.* (from *mechanic.*) According to the laws of mechanism (*Ray*).

MECHA'NICALNESS. *s.* (from *mechanic.*) 1. Agreeableness to the laws of mechanism. 2. Meanness.

MECHANI'CIAN. *s.* (*mechanicien*, Fr.) A man professing or studying the construction of machines (*Boyle*).

ME'CHANISM. *s.* (*mechanisme*, French.) 1. Action according to mechanick laws (*Arb.*). 2. Conctruction of parts depending on each other in any complicated fabrick.

MECKLENBURG, a country of Germany,

in the circle of Lower Saxony; bounded on the N. by the Baltic, on the E. by Pomerania, on the S. by Brandenburg, and on the W. by Holstein and Lunenburg. It extends 135 miles in length, and 90 where broadest, and abounds in corn, pastures, and game. This country was, for many centuries, under the government of one prince: but on the death of the sovereign in 1592, it was divided between his two sons; the eldest retaining the duchy of Mecklenburg and Schwerin, which is considerably the largest share, and the younger obtained the duchy of Mecklenburg Strelitz. Schwerin is the capital of the former, and New Strelitz of the latter.

MECKLEY, a province of Asia, bounded on the N. by Assam, on the E. by China, on the W. by Bengal, and on the S. by Roshaan and Burmah, to which last it is subject.

MECHLIN, a city of the Austrian Netherlands, capital of a district of the same name, with an archbishop's see. It consists of several small islands made by artificial canals, over which are a great many bridges; and its cathedral is a superb structure, with a very high steeple. Here is a great foundery for ordnance of all kinds; and it is famous for fine lace, and a sort of beer, which is sent into the neigbouring provinces. The territory of this town is a lordship, which comprehends two small districts containing nine towns of little consequence, and some villages. It submitted to the duke of Marlborough in 1706, and was taken by the French in 1746, but restored in 1748. In 1792, the French again took it, evacuated it the next year, and re-entered it in 1794. It is seated on the Dender, 10 miles N.E. of Brussels, and 15 S.E. of Antwerp. Lon. 4. 34 E. Lat. 51. 2 N.

MECHOACHAN, a province of New Spain, in the audience of Mexico; bounded on the N.W. by New Biscay, on the N.E. by Pamuco, on the E. by Mexico Proper, on the S. by the Pacific ocean, and on the W. by New Galicia. It is 200 miles in circumference, and is very rich, abounding in all the necessaries of life. It has also mines of silver and copper, great plenty of cocoa-nuts, and much silk.

Mechoachan, or Valladolid, a considerable town of New Spain, capital of the province of Mechoachan, with a bishop's see. It is seated near a great lake, 110 miles W. of Mexico. Lon. 102. 28 W. Lat. 20. 5 N.

Mechoachan, in the materia medica, the root of an American species of convolvulus. See Convolvulus.

MECONIUM, Μηκωνιον, from μηκων, *poppy*, in pharmacy, is the juice of the poppy, drawn by incision, and dried.

Meconium differs from opium, in that this first ouses out spontaneously, after an incision made in the heads of the poppies, whereas the other is drawn by violence, both from the heads and leaves, and even from the whole plant, bruised and pressed together. Meconium has all the virtues of foreign opium, but in a lower degree.

Meconium is also a black thick excrement, gathered in the intestines of a child during the time of gestation.

In colour and consistence it resembles pulp of cassia. It is also thought to resemble meconium, or juice of poppy; whence it takes its name. See Infancy and Midwifery.

MECRAN, a province of Persia, bounded on the N. by Segestan and Candahar, on the E. by Hindoostan, on the S. by the Indian ocean, and on the W. by Kerman. The southern part is dry, and little more than a desert; the northern is less so; but animals are rare, and the soil far from fertile.

MECRINHOS, a town of Portugal, in Tra los Montes, 15 miles N.N.E. of Torre de Moncove, and 24 S.E. of Mirandela. Lon. 6. 3 W. Lat. 41. 8 N.

MEDAL, a piece of metal in form of a coin, such as was either current money among the ancients, or struck on any particular occasion, in order to preserve to posterity the portrait of some great person, or the memory of some illustrious action. Scaliger derives the word medal from the Arabic *methalia*; a sort of coin with a human head upon it. But the opinion of Vossius is generally received; viz. that it comes from *metallum*, metal; of which substance medals are commonly made.

### I. *Utility of Medals in History, and various other Sciences.*

There are few studies of more importance to history than that of medals; the sole evidence we can have of the veracity of an historian being only such collateral documents as are evident to every body, and cannot be falsified. In modern times, these are found in public memoirs, instructions to ambassadors, and state papers of various kinds. Such memorials, however, are subject to various accidents, and besides commonly remain in the countries where they are first published, and cannot therefore give to the world at large that perfect and entire satisfaction which ought to be derived from genuine history; so that more durable and widely diffused monuments are still to be wished for. Such are public buildings, inscriptions, and statues; but these, excepting a few instances of the two last, are always confined to particular countries; so that medals alone remain as infallible documents of truth, capable of being diffused over all countries in the world, and of remaining through the latest ages.

The study of the Greek coins does not show the dates of events, though it illustrates the chronology of reigns. This defect, however, is abundantly supplied by those of Rome, which commonly mark the date of the prince's consulship, the year of his tribunician power; giving also, upon the reverse, the representation or poetical symbol of some grand event.

Medals afford the most authentic documents of the Roman history, in particular, that could have been invented by man. The histories of Nerva and Trajan are much better elucidated by medals than by authors; for the history of Suetonius ends with Domitian, and the Historiæ Augustæ Scriptores begins with Adrian: so that the reigns of the two emperors just mentioned are almost unknown; and Mr. Pinkerton is surprised that none of the learned have attempted to supply the defect. —"Capitolinus (says he), in his life of Maximinus junior, is quite puzzled to know if Maximus and

Pupienus were two emperors, or two names for the same. Had he happened on any of those coins which bear M. Cl. Pupienus Maximus Aug. he would have seen at once that Maximus was only another name for Pupienus."

Medals are useful in other sciences besides history. In geography, we find the situation of towns determined by their vicinity to some noted river, mountain, &c. Thus, ΜΑΓΝΗΤΩΝ ΣΙΠΥΛΟΥ shows that Magnesia was situated under Mount Sipylus. In like manner, it is shown from a medal, that Ephesus stood on the river Cayster; and there is extant a medal, bearing an inscription, which signifies Alexandria on the Scamander, a name given to Troy by Alexander the Great. The reverse has upon it the famous Apollo Smintheus of Homer. In natural history, also, medals are useful chiefly from the coins struck on the celebration of the secular games, in which the figures of various animals are preserved; and thus it may very often be determined whether any animal be known to the ancients or not. On many of the Greek medals are several uncommon plants and animals. Thus, on most of the medals of Cyrene is the figure of the celebrated Sylphium; and on those of Tyre, the shell-fish from which the famous Tyrian purple was procured. By means of medals, also, the exact delineations of many noble edifices are preserved, though not even a vestige of their ruins be now existing; so that the uses of them to the architect are very considerable. To the connoisseur they are absolutely necessary; because by them alone he is enabled to ascribe ancient busts and statues to their proper persons, with multitudes of other points of knowledge which cannot be otherwise determined. The elucidations of obscure passages in ancient authors by means of medals are so numerous and well known, that it is needless to insist upon them.

Mr. Addison has treated the connection betwixt medals and poetry at considerable length; but Mr. Pinkerton finds fault with him for preferring the Latin to the Greek poets. He observes, also, that the knowledge of Greek medals is most necessary for a sculptor, and perhaps an architect; but an acquaintance with Latin ones is preferable for a poet, or perhaps a painter. The reason of this difference is, that the former generally have on the obverse the head of some king, god, or goddess, of exquisite relief and workmanship; but the reverse seldom affords much fancy of symbol in the early Greek coins; and in the imperial Greek coins, is chiefly impressed with the temples of their deities. To a person of poetical imagination, however, the Roman coins afford the greatest entertainment, from the fine personifications and symbols to be found on their reverses; of which our author gives many instances.

As the reverses of medals are so useful for knowledge of personification, symbols of countries and actions, and the like, so the portraits to be seen on old coins are no less important to a painter; the high merit of a great number of them, in every character, justly intitling them to be regarded as the best studies in the world. Not to mention, that, to an historic painter, the science of ancient medals is absolutely necessary, that he may delineate his personages with the features they really bore while in existence. This can only be attained in this way, or from statues and busts; any one of which will cost as much as hundreds of medals; and indeed a collection of such is only attainable by princes.

The same things which render the study of medals important to a painter, do still more so to a sculptor; and in this particular, the study of the Greek coins is remarkably useful. The skill of the Greeks in the art of sculpture has always been admired throughout the world: and on their coins the heads of several deities are represented in the most exquisite *alto-relievo*. Our author therefore thinks it strange, that the Grecian coins should have hitherto been so little attended to by men of learning and taste. They may have been looked upon, he supposes, as belonging only to the province of the antiquary; but he assures us, that the Greek medals will afford satisfaction to the persons who value them only as pieces of workmanship. In most respects, they greatly excel those of Rome even in its best times; which our author supposes to have been from the days of Augustus to Adrian. "In the days of Adrian, in particular (says he), the Roman mint seems to have been the very seat of art and genius; witness the vast number of exquisite personifications, engraven with equal workmanship, which swarm on the medals of that prince. Yet from his time down to Posthumus, coins of admirable workmanship are to be found. Those of the Faustinas and Lucilla deserve particular mention. There is one, and not an uncommon one, of the latter in great brass, which yields to nothing of the kind. The reverse is a Venus with the name around her. The portrait of the obverse seems to spring from the field of the coin; it looks and breathes, nay talks, if you trust your eyes. The coins of Tarsus are extremely remarkable for a kind of perspective in the figures, as Froelich observes. On others are found triumphal arches, temples, fountains, aqueducts, amphitheatres, circi, hippodromes, palaces, basilicas, columns and obelisks, baths, sea ports, pharoses, and the like. These furnish much pleasure and instruction to the architect, and serve to form his taste to the ancient manner; that manner which unites perfect simplicity with sublimity and grace; that manner which every age admires, in proportion as it has genius to imitate."

### II. *History of Medals.*

The study of medals is not of very ancient date: none of the classic writers give any account of collections of them; though indeed many little particulars are passed without notice by them. In the times of the Greeks, a collection of such coins as then existed must have been but little regarded, as consisting only of those struck by the numerous little states which at that time used the Greek characters and language. Hence they would have had an air of domestic coinage, and no attention would have been paid to them, however exquisite their workmanship might have been. The little intercourse at that time carried on betwixt the different provinces also, greatly impeded any communication of knowledge to those who wrote histories; so that it is no wonder to find any small collections that might then have existed altogether unnoticed by them.

Almost as soon as any communication was opened between the Greeks and Romans, the latter treated the arts of the Greeks with all due respect and applause. Their coins were imitated by the Romans, and preserved in cabinets by the senators among their choicest treasures. Suetonius informs us, that on solemn occasions Augustus was accustomed to present his friends with medals of foreign states and princes, along with other va-

luable testimonies of his friendship. In a more advanced period of the Roman empire, however, individuals would undoubtedly form collections of coins peculiar to their own state; for Dr. Stukely, in his Medallic History of Carausius, informs us, that a complete series of silver coins was lately found in Britain, containing all the emperors down to Carausius inclusively. From Banduri we also know, that certain Greek coins were specially preserved by the Romans; and it appears from their code, that ancient gold and silver coins were made use of instead of gems; to which distinction those of Sicily were particularly intitled. From the decline of the Roman empire till towards the end of the 5th century, almost all branches of literature were involved in darkness, and the medallic science among the rest. While the Christian dominion of Constantinople lasted, indeed almost all the arts and sciences may be said to have been kept within its own boundaries; though the Arabs and eastern nations had some arts and sciences of their own: but after the destruction of the imperial city by the Turks, the Greeks were once more compelled to become fathers to the European science. Even before this time, indeed, some vestiges of a revival of literature had appeared in Italy; "and so intimate and necessary a connection (says Mr. Pinkerton) has now the study of medals with that of ancient erudition, that, on the earliest appearance of a revival of the latter, the former was also disclosed."

The first among the moderns who began to study the medallic science was Petrarch. Being desired by the emperor Charles IV. to compose a book containing the lives of eminent men, and to place him in the list, he replied, that he would do so whenever the emperor's life and conduct deserved it. In consequence of this conversation he afterwards sent the emperor a collection of gold and silver coins bearing the representations of eminent men, with an address suitable to his former declaration. A collection of coins was made in the next age by Alphonso king of Arragon; but though this monarch collected all that could be found throughout Italy, we know that there could not have been very many, as the whole were contained in an ivory cabinet, and carried always about with him. A very considerable collection was made by Anthony Cardinal St. Mark, nephew to Eugene IV. who ascended the pontifical chair in 1431; and soon after the grand museum at Florence was begun by Cosmo de Medici, where a collection of ancient coins and medals had a place among other curiosities. Corvinus king of Hungary about the same time formed a noble collection of coins along with ancient manuscripts and other valuable relics of antiquity.

Mr. Pinkerton considers Agnolo Poliziano, more commonly known by the name of Angelus Politianus, as the first writer who adduced medals as vouchers of ancient orthography and customs. He cites different coins of the Medicean collection in his Miscellanea written about the year 1490. By means of a cabinet of medals collected by Maximilian I. emperor of Germany, Joannes Huttichius was enabled to publish a book of the lives of the emperors, enriched with their portraits, delineated from ancient coins. It is generally supposed that this book, which appeared in 1525, was the first work of the kind; but Labbe, in his Bibliotheca Nummaria, mentions another named Illustrium Imagines, by one Andreas Fulvius, printed in 1517, in which most of the portraits seem to be from medals. About the year 1512 also, Guillaume Bude, a French author, had written his treatise De Asse, though it was not printed till many years afterwards. M. Grollier, treasurer of the French armies in Italy, during part of the 16th century, had a great collection of coins of different kinds of metals. After his death, his brass medals were sent to Provence, and were about to be sent into Italy; when the king of France, having got information of the transaction, gave orders to stop them, and purchase the whole at a very high price for his own cabinet of antiquities. M. Grollier had an assortment of gold and silver as well as of brass medals: the cabinet in which they were contained fell two centuries afterwards into the hands of M. L'Abbe de Bothelin, and was known to have been that of Grollier, from some slips of paper, on which was his usual inscription for his books, Joannis Grollierii et amicorum.

Cotemporary with Grollier was Guillaume de Choul, who was likewise a man of rank and fortune. He had a good collection of medals, and published many in his Treatise on the Religion of the ancient Romans in 1557. In the low countries we know, from the letters of Erasmus, that the study of medals was begun about the beginning of the 16th century. About the middle of that century, Hubertzus Goltzius, a printer and engraver, travelled over most countries in Europe searching for coins and medals, in order to publish books concerning them. From one of these works it appears, that there were then in the low countries 200 cabinets of medals, 175 in Germany, upwards of 380 in Italy, and 200 in France. It is probable, however, that there are now four times as many in these countries, besides 500 in Britain; but we are not to imagine that all these were grand collections, for of such there are not above a dozen even in Italy: most of those just mentioned were of the class named caskets of medals, containing from 100 to 1000 or 2000.

There are few countries, Italy excepted, in which a greater number of coins have been found than in Britain; though we are by no means well acquainted with the time when the study of them commenced. Mr. Pinkerton suspects that Camden was one of the first, if not the very first, British author who produced medals in his works, and who must have had a small collection. Speed's Chronicle, published in the 17th century, was illustrated with coins from sir Robert Cotton's cabinet. Gordæus's collection was purchased by Henry prince of Wales, brother to Charles I. to whom he left it at his death. According to Joseph Scaliger, it consisted of 30,000 coins and medals. A collection of 5500 coins was purchased by archbishop Laud for 600l. and given to the Bodleian library. Thomas earl of Arundel, earl-marshal of England, well known from the Arundelian tables and other antiquities which he imported from Greece and Italy into Britain, had a rich cabinet of medals collected by Daniel Nisum. The dukes of Buckingham and Hamilton, sir William Paston, sir Thomas Fanshaw of Ware-Park, sir Thomas Hanmer, Ralph Sheldon, esq. Mr. Selden, &c. are enumerated by Evelyn as collectors of medals. Charles I. as well as his historian the earl of Clarendon, were also collectors. The king had a very fine cabinet; which, however, were dissipated and lost during the civil commotions. Oliver Cromwell had a small collection; and the cabinet of Charles II. is mentioned by Vaillant in the preface to his treatise entitled Nummi in Coloniis, &c. This branch of magnificence has not been much

attended to by succeeding British monarchs; though his present majesty has a very good collection of ancient gold coins.

A great number of fine cabinets have been formed in Britain since the time of Evelyn. About the year 1720 Haym makes mention of those of the duke of Devonshire, the earls of Pembroke and Winchelsea, sir Hans Sloane, sir Andrew Fontaine, Mr. Sadler, Mr. Abdy, Mr. Wren, Mr. Chicheley, and Mr. Kemp. At present there are many remarkable collections; but that of the late Dr. Hunter was deservedly esteemed the most remarkable in Europe, excepting that of the late French king. It was not only formed at a great expence, but with much care and ability; many foreign medals offered to it having been rejected. The other remarkable collections are those of the duke of Devonshire, the earl of Pembroke, earl Fitzwilliam, formerly the marquis of Rockingham's, the honourable Horace Walpole, the reverend Mr. Crachrode, the reverend Mr. Southgate, Mr. Townley, Mr. R. P. Knight, Mr. Edward Knight, Mr. Tyson, Mr. Barker, Mr. Brown, and several others. The museum and universities have also collections; as well as the lawyers library, and the colleges in Scotland.

### III. *Materials of which Medals are constructed.*

Medals are formed of gold, silver, and the various modifications of copper. The gold usually made use of in coinage is about the fineness of 22 carats; and as the art of purifying this metal was very much unknown in former times, the most ancient medals are for this reason much more impure than the modern coins. Gold is never found in its native state above 22 carats fine; and the very ancient medals are much under that standard. Many of them are composed of a mixture of gold and silver, called by the ancients electrum. The gold medals were made of much finer metal after Philip of Macedon became possessed of the gold mines of Philippi in Thrace, and the medals of his son Alexander the Great are equally fine; as well as those of some other princes of that age. Those of the Egyptian Ptolemies are of the fineness of 23 carats three grains, with only one grain of alloy. The Roman coins are very pure, even from the earliest times; the art of refining gold being well known before any was coined at Rome. Some authors are of opinion, that the Roman coins begin to fall short of their purity after the time of Titus; but Mr. Pinkerton denies that any thing of this kind takes place till the time of the emperor Severus; and even then only in a very few instances. Most of the Roman gold was brought from Dalmatia and Dacia, where that metal is still to be met with. A very remarkable circumstance is observed in the eastern part of Hungary, which belonged to the ancient Dacia: it germinates in the vines of Tokay, and is found in their stems; as it is elsewhere in the straw of corn.

Pliny informs us, and indeed it is generally known, that gold and silver are found mixed together in the earth. When the silver amounted to one-fifth part of the gold, the metal was called electrum; but sometimes the quantity of silver was added artificially. The gold was in those days, as well as at present, refined by means of mercury: and the ancient artists had certainly attained to great perfection in this branch of metallurgy; as Bodin tells us, that the goldsmiths of Paris, upon melting one of Vespasian's gold coins, found only $\frac{1}{788}$th part of alloy.

Most of the ancient silver, particularly that of Greece, is less pure than that of succeeding times even the Roman silver is rather inferior to the present standard, and that from the very beginning; but in the time of Severus, the silver appears very bad, and continues so until the time of Dioclesian. Many writers upon this subject have mistaken the *denarii ærei*, coins of brass washed with silver, for silver currency. Silver coins are extremely scarce from the time of Claudius Gothicus to that of Dioclesian, or from the year 270 to 284; in which short space no fewer than eight emperors reigned. Silver at that time was found mostly in Spain; and the commerce with that country was disturbed by the usurpers who arose in Gaul: and such were the troubles of the times, that not only the silver, but also the gold coins of those eight emperors, are extremely scarce. There is still, however, some silver extant of these eight emperors; and it is certain, that copper washed was never used as silver currency, but was entirely a distinct coinage. Occasional depravations of silver had taken place long before; as Pliny tells us, that Mark Antony mixed iron with his silver denarii; and Mr. Pinkerton informs us, that he had seen a denarius of Antony, which was attracted by a magnet.

The ancient brass coins consist of two kinds: the red or Cyprian, which indeed is no other than copper; and the common yellow brass. Our author observes, that in the Roman coinage, brass was of double the value of copper, and he is of opinion that it was the same among the Greeks; and the latter is the metal most commonly made use of in the Greek coinage. The Roman sestertii are always of brass: the middling sized kind are partly copper and partly brass; the former being double the value of the latter, which are the ases.

Mr. Pinkerton next proceeds to give an account of the mixed metals used among the Romans. In Britain all kinds of coins made of mixed metal are without hesitation alleged to be forgeries; although it is certain that the variety of mixed metals used in coinage was very considerable. The most valuable mixture was that of gold or silver already mentioned, named electrum; the silver commonly amounting to one-fifth part of the gold made use of, or perhaps more. Of this mixture are many of the early coins of Lydia, and some other Asiatic states; also those of the kings of the Bosphorus Cimmerius, during the imperial ages of Rome. Next to the electrum were the coins of Corinthian brass: but Mr. Pinkerton informs us, that not a single coin was ever struck of this metal by the ancients; it having been constantly employed only in the fabrication of vases or toys. It was in use at any rate only for a very short time; being altogether unknown in the days of Pliny the elder. Our author therefore ridicules those who pretend not only to find out imperial coins of this metal, but to discover three kinds of it; viz. one in which the gold predominates, another in which the silver prevails, and a third where the brass is most conspicuous. He gives Æneas Vico, one of the most ancient writers on medals, as the author of this idea; but whose opinions were confuted by one Savot, a writer in the 17th century. Vico mentions a coin of this kind struck under Augustus, another of Livia, and a third of Claudius. The mistake, he is of opinion, arose from the circumstance of the first propagator not being able to account for the various mixtures and modifications of brass observable in ancient coins of the large size; and which in so common a metal appear very odd to the moderns.

Besides the authority of Pliny and other antiquaries of more modern date, who all declare that they never saw a single medal of Corinthian brass, or of that metal mixed with silver and gold, our author adduces another evidence, which he looks upon to be superior to either; viz. that those who have given into this supposition imagine, that the large pieces called *sestertii*, and others called *dupondiarii*, worth about twopence or a penny, are said to have been composed of this precious metal. It is unreasonable to think, that any proportion of gold or silver could have been made use of in these. The coins said to have been struck upon Corinthian brass are only done upon a modification of common brass; of which we know, that in proportion to the quantity of zinc made use of in conjunction with the copper, the metal assumes a variety of hues. On the authority of Pliny he informs us, that the coins mistaken for Corinthian brass were no other than prince's metal.

The Egyptian silver coins, struck under the Roman emperors, are at first of tolerably pure silver; but afterwards degenerate into a mixture of copper and tin with a little silver. They are very thick, but many of them are elegantly struck, with uncommon reverses. There are likewise three sets of brass coins belonging to this country, from the earliest times of the Roman emperors there. Some of these are of bell-metal or pot-metal; and after the time of Gallienus and Valerian, the coinage of brass with a small addition of silver becomes authorised by the state; the coins struck upon it being called *denarii æris*. Those of lead or copper plated with silver have been fabricated by Roman forgers. Some coins of lead, however, have been met with, of undoubted antiquity: and an ancient writer informs us, that tin money was coined by Dionysius; but none has been found. The lead coins of Tigranes king of Armenia, mentioned as genuine by Jobert, are accounted forgeries by Mr. Pinkerton and other modern medallists. Plautus, however, makes mention of leaden coins, and several of them have been found; but our author looks upon them to have been chiefly essay pieces, struck in order to let the artist judge of the progress of the dye. Others are the plated kind already mentioned, fabricated by ancient forgers, but having the plating worn off. A great number of leaden coins are mentioned by Ficorini, in a work entitled Piombi Antichi, in which he supposes them to have served as tickets for guests; and coins of the same kind are also mentioned by Passeri. In the work intitled Notitia Imperii Romani, there is mention of coins made of leather, but none of them have ever been found.

### IV. *Of the Arrangement of Medals.*

It has already been observed, that one of the principal uses of medals is the elucidation of ancient history; hence the arrangement of medals is the first thing that must occur in the formation of a cabinet. The most ancient medals with which we are acquainted are those of Alexander I. of Macedon, who began to reign about 501 years before Christ. The series ought of consequence to begin with him, and to be succeeded by the medals of Sicily, Caria, Cyprus, Heraclia, and Pontus. Then follow Egypt, Syria, the Cimmerian Bosphorus, Thrace, Bithynia, Parthia, Armenia, Damascus, Cappadocia, Paphlagonia, Pergamus, Galatia, Cicilia, Sparta, Pæonia, Epirus, Illyricum, Gaul, and the Alps, including the space of time from Alexander the Great to the birth of Christ, and which is to be accounted the third medallic series of ancient monarchs. The last series goes down to the fourth century, including some of the monarchs of Thrace, Bosphorus and Parthia, with those of Comagene, Edessa or Osrhoene, Mauritania, and Judæa. A most distinct series is formed by the Roman emperors, from Julius Cæsar to the destruction of Rome by the Goths; nay for a much longer period, were it not that towards the latter part of it the coins become so barbarous as to destroy the beauty of the collection. Many series may be formed of modern potentates.

By means of medals we can with great certainty determine the various ornaments worn by ancient princes as badges of distinction. The Grecian kings have generally the diadem, without any other ornament; and though in general the side of the face is presented to view, yet in some very ancient Greek and Roman consular coins full faces of excellent workmanship are met with. On several coins also two or three faces are to be seen, and these are always accounted very valuable.

The diadem, which was no more than a ribband tied round the head with a floating knot behind, adorns all the Grecian princes from first to last, and is almost an infallible mark of sovereign power. In the Roman consular coins it is seen in conjunction with Numa and Ancus, but never afterwards till the time of Licinius, the colleague of Constantine. Dioclesian, indeed, according to Mr. Gibbon, first wore the diadem, but his portrait upon coins is never adorned with it. So great an aversion had the Romans to kingly power, that they rather allowed their emperors to assume the radiated crown, the symbol of divinity, than to wear a diadem; but after the time of Constantine it becomes common. The radiated crown appears first on the posthumous coins of Augustus as a mark of deification, but in somewhat more than a century became common.

The laurel crown, at first a badge of conquest, was afterwards permitted by the senate to be worn by Julius Cæsar, in order to hide the baldness of his head. From him all the emperors appear with it on their medals, even to our own times. In the lower empire the crown is sometimes held by a hand above the head, as a mark of piety. Besides these, the naval, mural, and civic crowns appear on the medals both of emperors and other eminent men, to denote their great actions. The laurel crown is also sometimes worn by the Greek princes. The Arsacidæ of Parthia wear a kind of sash round the head, with their hair in rows of curls like a wig. The Armenian kings have the tiara, a kind of cap which was esteemed the badge of imperial power in the east. Conical caps are seen on the medals of Xerxes, a petty prince of Armenia, and Juba the father, the former having a diadem around it.

The impious vanity of Alexander and his successors in assuming divine honours is manifest on their medals, where various symbols of divinity are met with. Some of them have an horn behind their ear, either to denote their strength, or that they were the successors of Alexander, to whom this badge might be applied as the son of Jupiter Ammon. This, however, Mr. Pinkerton observes, is the only one of these symbols which certainly denotes an earthly sovereign, it being doubted whether the rest are not all figures of gods. According to Eckhet, even the horn and diadem belong to Bacchus, who invented the latter to cure his headachs; and, according to the same author, the only monarch who appears on coins with the

horn is Lysimachus. We are informed, however, by Plutarch, that Pyrrhus had a crest of goats horns to his helmet; and the goat we know was a symbol of Macedon. Perhaps the successors of Alexander wore this badge of the horn in consequence. The helmet likewise frequently appears on the heads of sovereigns, and Constantine I. has helmets of various forms curiously ornamented.

The diadem is worn by most of the Greek queens, by Orodaltis, daughter of Lycomedes, king of Bithynia; and though the Roman empresses never appear with it, yet this is more than compensated by the variety of their head-dresses. Sometimes the bust of an empress is supported by a crescent, to imply that she was the moon as her husband was the sun of the state. The toga, or veil drawn over the face, at first implied that the person was invested with the pontifical office; and accordingly we find it on the busts of Julius Cæsar while Pontifex Maximus. It likewise implies the augurship, the augurs having a particular kind of gown called *lana*, with which they covered their heads when observing an omen. In latter times this implies only consecration, and is common in coins of empresses. It is first met with on the coins of Claudius Gothicus as the mark of consecration of an emperor. The *nimbus*, or glory, now appropriated to saints, has been already mentioned. It is as ancient as Augustus, but is not to be met with on many of the imperial medals, even after it began to be appropriated to them. There is a curious coin, which has upon the reverse of the common piece with the head of Rome Urbs Roma, in large brass, Constantine I. sitting amid victories and genii, with a triple crown upon his head for Europe, Asia, and Africa, with the legend Securitas Romæ.

In general only the bust is given on medals, though sometimes half the body or more; in which latter case the hands often appear with ensigns of majesty in them; such as the globe said to have been introduced by Augustus as a symbol of universal dominion; the sceptre sometimes confounded with the consular staff, a roll of parchment, the symbol of legislative power, and an handkerchief expressive of the power over the public games, where the emperor gave the signal. Some princes hold a thunderbolt, showing that their power on earth was equal to that of Jupiter in heaven; while others hold an image of victory.

Medals likewise afford a good number of portraits of illustrious men; but they cannot easily be arranged in chronological order, so that a series of them is not to be expected. It is likewise vain to attempt the formation of a series of gods and goddesses to be found on ancient coins. Mr. Pinkerton thinks it much better to arrange them under the several cities or kings whose names they bear. A collection of the portraits of illustrious men may likewise be formed from medals of modern date.

The reverses of ancient Greek and Roman coins afford an infinite variety of instruction and amusement. They contain figures of deities at full length, with their attributes and symbols, public symbols and diversions, plants, animals, &c. &c. and in short almost every object of nature or art. Some have the portrait of the queen, son, or daughter of the prince whose image appears on the face or obverse; and these are esteemed highly by antiquaries, not only because every coin stamped with portraits on both sides is accounted valuable, but because they render it certain that the person represented on the reverse was the wife, son, or daughter of him who appears on the obverse; by which means they assist greatly in the adjusting of a series. Some, however, with two portraits are common, as Augustus, the reverse of Caligula; and Marcus Aurelius, reverse of Antoninus Pius.

We find more art and design in the reverses of the Roman medals than of the Greek: but, on the other hand, the latter have more exquisite relief and workmanship. The very ancient coins have no reverses, excepting a rude mark struck into the metal resembling that of an instrument with four blunt points on which the coin was struck; and was owing to its having been fixed by such an instrument on that side to receive the impression upon the other. To this succeeds the image of a dolphin, or some small animal, in one of the departments of the rude mark, or in an hollow square: and this again is succeeded by a more perfect image, without any mark of the hollow square. Some of the Greek coins are hollow in the reverse, as those of Caulonia, Crotona, Metapontum, and some other ancient cities of Magna Græcia. About 500 B.C. perfect reverses appear on the Greek coins, of exquisite relief and workmanship. "The very muscles of men and animals (says Mr. Pinkerton) are seen, and will bear inspection with the largest magnifier as ancient gems. The ancients certainly had not eyes different from ours; and it is clear that they must have magnified objects. A drop of water forms a microscope; and it is probable this was the only one of the ancients. To Greek artists we are indebted for the beauty of the Roman imperial coins; and these are so highly finished, that on some reverses, as that of Nero's decursion, the *adventus* and *progressio* of various emperors, the *fundator pacis* of Severus, the features of the emperor, riding or walking, are as exact as on the obverse. But though the best Greek artists were called to Rome, yet the Greek coins under the Roman emperors are sometimes well executed, and always full of variety and curiosity. No Roman or Etruscan coins have been found of the globular form, or indented on the reverse like the early Greek. The first Greek are small pieces of silver, while the Roman are large masses of copper. The former are struck; the latter cast in moulds. The reverses of the Roman coins are very uniform, the prow of a ship, a car, or the like, till about the year 100 B.C. when various reverses appear on their consular coins in all metals. The variety and beauty of the Roman imperial reverses are well known. The medallist much values those which have a number of figures; as the *Puellæ Faustinianæ*, of Faustina, a gold coin no larger than a sixpence, which has 12 figures; that of Trajan, *regna assignata*, has four; the *congiarium* of Nerva, five; the allocution of Trajan, seven; of Hadrian, 10; of Probus, 12. Some Roman medals have small figures on both sides, as the *Apolloni sancto* of Julian II. Such have not received any peculiar name among the medallists. Others have only a reverse, as the noted *spintriati*, which have numerals I. II. &c. on the obverse."

The names of the deities represented on the reverses of Greek coins are never expressed; perhaps, as Mr. Pinkerton supposes, out of piety, a symbolical representation of their attributes being all that they thought proper to delineate; but the Roman coins always express the name, frequently with an adjunct, as Veneri Victrici, &c. In others, the name of the emperor or empress is added; as Pudicitiæ Augustæ, round an image

of Modesty; VIRTUS AUGUSTI, a legend for an image of Virtue.

The principal symbols of the divine attributes to be met with on the Greek medals are as follow:

1. Jupiter is known on the coins of Alexander the Great by his eagle and thunderbolts; but when the figure occurs only on the obverses of coins, he is distinguished by a laurel crown, and placid bearded countenance. Jupiter Ammon is known by the ram's horns twisting round his ear; a symbol of power and strength, assumed by some of the successors of Alexander the Great, particularly by Lysimachus.

2. Neptune is known by his trident, dolphin, or being drawn by sea-horses; but he is seldom met with on the Grecian coins.

3. Apollo is distinguished by an harp, branch of laurel, or tripod; and sometimes by a bow and arrows. In the character of the Sun, his head is surrounded with rays; but when the bust only occurs, he has a fair young face, and is crowned with laurel. He is frequent on the coins of the Syrian princes.

4. Mars is distinguished by his armour, and sometimes by a trophy on his shoulders. His head is armed with a helmet, and has a ferocious countenance.

5. Mercury is represented as a youth, with a small cap on his head, wings behind his ears and on his feet. He is known by the cap, which resembles a small hat, and the wings. He appears also with the caduceus, or wand twined with serpents, and the *marsupium*, or purse, which he holds in his hand.

6. Æsculapius is known by his bushy beard, and his leaning on a club with a serpent twisted round it. He sometimes occurs with his wife Hygeia or Health, with their son Telesphorus or Convalescence between them.

7. Bacchus in known by his crown of ivy or vine, his diadem and horn, with a tiger and satyrs around him.

8. The figure of Hercules is common on the coins of Alexander the Great, and has frequently been mistaken for that of the prince himself. He appears sometimes as a youth, and sometimes with a beard. He is known by the club, lion's skin, and remarkable apparent strength; sometimes he has a cup in his hand, and a poplar tree, as a symbol of vigour, is sometimes added to the portrait.

9. The Egyptian Serapis is known by his bushy beard, and a measure upon his head.

10. Apis is delineated in the form of a bull, with a flower of the lotos, the water-lily of the Nile, supposed by Macrobius to be a symbol of creation; and Jamblichus tells us, that Osiris was thought to have his throne in it.

11. Harpocrates, the god of silence, appears with his finger on his mouth; sometimes with the sistrum in his left hand; a symbol common to most of the Egyptian deities.

12. Canopus, another Egyptian deity, appears in the shape of a human head placed on a kind of pitcher. "This deified pitcher (says Mr. Pinkerton) seems to refer to an anecdote of ancient superstition, which, I believe, is recorded by Plutarch. It seems some Persian and Egyptian priests had a contest which of their deities had the superiority. The Egyptian said, that a single vase, sacred to Serapis, would extinguish the whole power of the Persian deity of fire. The experiment was tried; and the wily Egyptian, boring holes in the vase and stopping them with wax, afterwards filled the vase with water; which, gushing through the holes as the wax melted, extinguished the Persian deity. Hence the vase was deified."

13. The *Holy Senate* and *Holy People* appear frequently on Greek imperial coins, sometimes represented as old men with beards, at others as youths.

The goddesses represented on medals are,

1. Juno, represented by a beautiful young woman, sometimes with a diadem, sometimes without any badge, which is reckoned a sufficient distinction, as the other goddesses all wear badges. Sometimes she appears as the goddess of marriage; and is then veiled to the middle and sometimes to the toes. She is known by the peacock, a bird sacred to her from the fable of Argus.

2. Minerva is very common on the coins of Alexander the Great; and her bust has been mistaken by the celebrated painter Le Brun for the hero himself. Her symbols are, her armour; the spear in her right hand, and the ægis with a Medusa's head in her left; an owl commonly standing by her.

3. Diana of Ephesus is commonly represented on the Greek imperial coins; and appears with a great number of breasts, supposed to denote universal nature. She is supported by two deer, and carries a pannier of fruit upon her head. The bust of this goddess is known by the crescent on her brow, and sometimes by the bow and quiver at her side.

4. Venus is known by an apple, the prize of beauty, in her hand. Sometimes she is distinguished only by her total want of dress; but is always to be known by her extraordinary beauty, and is sometimes adorned with pearls about the neck.

5. Cupid is sometimes met with on the Syrian coins, and is known by his infancy and wings.

6. Cybele is known by a turreted crown and lion: or is seen in a chariot drawn by lions.

7. Ceres is known by her garland of wheat, and is common on the Sicilian coins; that island being remarkable for its fertility. Sometimes she has two serpents by her, and is sometimes drawn in a chariot by them. She carries in her hands the torches with which she is fabled to have gone in search of her daughter Proserpine.

8. Proserpine herself is sometimes met with on coins with the name of κορη, or the girl.

9. The Egyptian Isis has a bud or flower on her head; a symbol of the perpetual bloom of the inhabitants of heaven. She carries also a sistrum in her hand.

10. The Sidonian Astarté appears on a globe supported on a chariot with two wheels, and drawn by two horses.

These are the deities most commonly represented on the Greek coins. The more uncommon are, Saturn with the scythe, or with a hook on the Heraclian coins; Vulcan with his tongs, on the reverse of a coin of Thyatira, represented at work in the presence of Minerva. Adranus, a Sicilian god, is sometimes represented on coins with a dog. Anubis, an Egyptian deity, has a dog's head. Atis is known by his Phrygian bonnet; Castor and Pollux by a star on the head of each; Dis, by his old face, dishevelled hair and beard, and a hook; Flora by a crown of flowers; Nemesis by her wheel; and Pan by his horns and ears belonging to some kind of beast.

There are likewise to be found on medals many different symbols by themselves; of the most re-

markable of which we shall give the following table, with their significations:

| Symbols. | Signification. |
| --- | --- |
| 1. Vases with sprigs, | Solemn games. |
| 2. Small chest or hamper with a serpent leaping out, | Mystic rites of Bacchus. |
| 3. Anchor on Seleucian medals, | Coin struck at Antioch, where an anchor was dug up. |
| 4. Apollo on Syrian coins, on an inverted hamper, | Covered tripod. |
| 5. Bee, | Aristeus the son of Apollo. |
| 6. Laurel, | Apollo. |
| 7. Reed, | A river. |
| 8. Ivy and grapes, | Bacchus. |
| 9. Poppy, | Ceres and Proserpine. |
| 10. Corn, | Ceres. |
| 11. Owl and olive, | Minerva. |
| 12. Dove, | Venus. |
| 13. Torch, | Diana, Ceres, or Proserpine. |
| 14. Mudnis, or conic stone, | The Sun, Belus, or Venus. |

*Symbols of Countries, &c.*

| | |
| --- | --- |
| 15. Pomegranate flowers, | Rhodes. |
| 16. Owl, | Athens. |
| 17. Pegasus, | Corinth. |
| 18. Wolf's head, | Argos. |
| 19. Bull's head, | Bœotia. |
| 20. Minotaur's head and labyrinth, | Crete. |
| 21. Horse's head, | Pharsalia. |
| 22. Lion, | Marseilles. |
| 23. Tortoise, | Peloponnesus. |
| 24. Sphinx, | Scio. |
| 25. Three legs joined, as in the Isle of Man-money, | Sicily. |
| 26. Horse, | Thessaly. |
| 27. The crescent, | Byzantium. |
| 28. Bull, | Supposed to be a river. |
| 29. Ensign with the letters COL. | A colony drawn from one legion. |
| 30. Bull, | Apis, strength or security. |
| 31. Caduceus, | Peace and concord. |
| 32. Cornucopia, | Abundance. |
| 33. Pontifical hat, | Priesthood. |
| 34. Parazonium, | Baton of command. |
| 35. Globe on an altar with three stars, | The world preserved by the gods for the three sons of Constantine I. |
| 36. Fort and gate, | Security. |
| 37. Tribuli, a kind of chevaux de frize, | Unknown. |
| 38. Altar or tripod, | Piety. |
| 39. Dolphin, | Apollo. |
| 40. Lectisternia, | Festivals. |
| 41. Lituus, or twisted wand, | Augurship. |
| 42. Apex, or cap with strings, | Pontificate. |
| 43. Thensa, or chariot employed to carry images, | Consecration of an empress. |
| 44. Peacock, | Consecration of an empress. |
| 45. Eagle, | Consecration of an emperor. |

The legends put upon medals are designed as explanations of them; but as the compass of even the largest coins does not admit of any great length of inscription, it has always been found necessary to use abbreviations; and in readily decyphering these lies a considerable part of the difficulty of the science. This, however, is greater in the Roman than in the Greek medals; for the Greeks commonly insert as much of the word as is sufficient to enable us easily to understand its meaning; but it is common for those who attempt to explain letters that do not often occur to fall into very ridiculous errors. Of this Mr. Pinkerton gives a most remarkable instance in Fortunius Licetus, a learned man, who finding upon a coin of Adrian the letters Α. ΙΔ. signifying the 14th year of that emperor's reign, imagined that they signified *lucernas invenit Delta;* "Delta invented lanthorns;" and thence ascribed the origin of lanthorns to the Egyptians. Tables explaining the meaning of the abbreviations found upon medals have been published by Patin, Ursatus, and others.

### V. *Of Medallions, Medallets, &c.*

Besides the ordinary coins of the ancients, which passed in common circulation through the country, there were others of a larger size, which are now termed *medallions.* These were struck on the commencement of the reign of a new emperor and other solemn occasions: frequently also, by the Greeks in particular, as monuments of gratitude or of flattery. Sometimes they were mere trial or pattern pieces; and those abound after the time of Maximian with the words *Tres Monetæ* on the reverse. The common opinion is, that all the Roman pieces of gold exceeding the denarius aureus, all in silver exceeding the denarius, and all in brass exceeding the sestertius, went under the denomination of medallions: but Mr. Pinkerton thinks that many of these large pieces went in circulation, though not very commonly, as our five and two guinea pieces, silver crowns, &c. do in this country. The finest medallions were presented by the mint-masters to the emperor, and by the emperor to his friends, as specimens of fine workmanship. The best we have at present are of brass, and many of them composed of two sorts of metal; the centre being copper, with a ring of brass around it, or the contrary; and the inscription is sometimes confined to one of the metals, sometimes not. There is a remarkable difference between the Greek and Roman medallions in point of thickness; the latter being frequently three or four lines thick, while the other seldom exceed one. Very few medallions, however, were struck by the Greeks before the time of the Roman emperors; but the Greek medallions of the emperors are more numerous than those of the Romans themselves. All these pieces, however, are of such high price that few private persons are able to purchase them. In the last century Christina queen of Sweden procured about 300. In the late king of France's collection there were 1200, a number formerly supposed not to exist; but Dr. Hunter's collection contains about 400, exclusive of the Egyptian.

Besides these large pieces, there are smaller ones of a size somewhat larger than our half-crowns; and by Italian medallists are called *me-*

*daglion cini*, or small medallions. They are still scarcer than the large kind.

There is still a third kind, which have almost escaped the notice of medallists, viz. the small coins or missilia scattered among the people on solemn occasions; such as those struck for the slaves on account of the Saturnalia; counters for gaming; tickets for baths and feasts; tokens in copper and in lead, &c. These are distinguished by Mr. Pinkerton by the name of medallets. Many, or perhaps almost all, of those struck for the Saturnalia were satirical; as the slaves had then a licence to ridicule not only their masters but any person whatever. Mr. Pinkerton mentions one of the most common pieces of this kind, which has on the obverse the head of an old woman veiled, with a laurel crown; the reverse only S. C. within a wreath. Baudelot is of opinion that it is the head of Acca Laurentia, the nurse of Romulus, to whom a festival was ordained. "Perhaps (says Mr. Pinkerton) it was struck in ridicule of Julius Cæsar; for the manner of the laurel crown, and its high appearance over the head, perfectly resemble that of Julius on his coins." Some have a ship upon one side; on the reverse T, or a cross, which was the image of Priapus; and occasioned many false invectives against the first Christians, who paid such respect to the cross. Some pieces have the heads of the emperors upon one side; on the reverse only numerals III. IV. V. &c. and the noted spintriati of Tacitus. Both these kinds appear tickets for the baths, as the number seems to denote the particular bath. Some have the head of a girl, with a vessel used at the baths in her hand. The spintriati are so immodest, that few will bear mention. But some are merely ludicrous; as one which has an ass with a bell about his neck, and a soldier riding him; another with two figures hoisting a woman in a basket into the air. Of those that will just bear mention, is a man with titles around him, as chief of the games; and a woman in ridicule of the modest bath-girl above-mentioned. There is also one marked XIX, on which appears an imperator triumphing in a car: this car is placed on the back of a camel; and behind the imperator is a monkey mimicking him.

A fourth class of medals are called *contorniati*, from the Italian *contorniato*, encircled; because of the hollow circle which commonly runs around them. They are distinguished from medallions by their thinness, faint relief, reverses sometimes in relief, sometimes hollow; and in general by the inferiority in their workmanship. The opinions of medallists concerning these pieces are very various: some suppose them to have been struck by Gallienus to the memory of illustrious men and celebrated *athletæ*, at the time that he caused all the consecration coins of his predecessors to be restored; others ascribe their invention to Greece, &c. but Mr. Pinkerton is of opinion that they were only tickets for places at public games. Many of them, notwithstanding their inferior workmanship, are very valuable on account of their preserving the portraits of some illustrious authors of antiquity no where else to be found. Much dependance, however, cannot be put on the portraits of Greek authors and eminent men found upon some of them; for, though we know that the busts of Sallust, Horace, &c. must have been struck when their persons were fresh in the memory of the artists, yet it was otherwise with Homer, Solon, Pythagoras, &c. which are to be found on some of them. Even these, however, are valuable, as being ancient and perhaps traditional portraits of these great men. The last whose portraits are supposed to have been delineated in this way, are Apollonius Tyaneus who flourished in the time of Domitian, and Apuleius in that of Marcus Antoninus. Mr. Pinkerton thinks it a confirmation of his opinion concerning these medals, that the reverses always contain some device alluding to public games, as that of a charioteer driving a chariot, &c.

### VI. *Directions for making Cabinets.*

We must now proceed to the last part of our subject, viz. that of giving directions for the formation of cabinets. As we have already seen that the formation of any one must be attended with very considerable expence, it is necessary for every one who attempts this to proportion the cabinet to his own circumstances. There are, properly speaking, three kinds of cabinets. I. Those meant to contain a coin of every sort that has been issued from the mint in every age and country; but this, which may be called the large and complete cabinet, is not to be purchased by private persons. That of Dr. Hunter already mentioned is perhaps one of the best private cabinets ever known; and cost 23,000l. but as many duplicates were sold as cost 2000l. by which means the expence was reduced to 21,000l. The vast collection made by the king of France cost upwards of 100,000l. The smaller cabinet may be supposed to consist only of middle and small Roman brass, English pennies, groats, &c. with a few medals of the more valuable kind, and may be supposed to incur an expence of from 200 to 1000l. The smallest kind is called a casket of medals, and does not consist of above a thousand at most of various kinds; and consequently the expence must depend on the pleasure of the proprietor.

In the formation of the grand cabinet, it must be observed that the Greek medals of every denomination do not admit of any arrangement by the metals like the Roman; not any regular series of this kind being met with even in the most opulent cabinets. Hence in all collections the civic coins are ranged according to an alphabetical order; and the monarchic in a chronological one. The same rule is to be observed in the Roman consular medals; they are ranged, like the coins of the Greek cities, in an alphabetical series of the families. The Roman imperial coins are only those capable of being arranged according to sizes and metals. Even from this must be excepted the minimi, or very smallest coins; which are so scarce, that the only regular series of them in the world is that belonging to the king of Spain, which was formed by a most skilful French medallist, and consists of all the metals. The arrangement of a grand cabinet, according to Mr. Pinkerton, is as follows:

"I. The coins of cities and of free states in alphabetical order; whether using Greek, Roman, Punic, Etruscan, or Spanish characters.

"II. Kings in chronological series, both as to foundation of empire and seniority of reign.

"III. Heroes, heroines, founders of empires and cities.

"IV. Other illustrious persons.

"V. Roman ases.

"VI. Coins of families, commonly called consular.

"VII. Imperial medallions.

"VIII. Imperial gold.

"IX. Imperial *minimi* of all metals.

"X. Imperial silver.

"XI. Imperial first brass.

"XII. Second brass.

"XIII. Third brass.

"XIV. Colonial coins, which are all of brass.

"XV. Greek cities under the emperors, of all metals and sizes. In a smaller cabinet they may be put with the Roman, according to their metal and size. Those without the emperor's head go to class I. though struck in Roman times.

"XVI. Egyptian coins struck under the Roman emperors, of all metals and sizes. They are mostly of a base metal called by the French *patin*; it is a kind of pot metal or brittle brass.

"XVII. Contorniati, or ticket medals.

"XVIII. Coins of Gothic princes, &c. inscribed with Roman characters.

"XIX. Coins of southern nations using uncommon alphabets; as the Persian, Punic, Etruscan, and Spanish.

"XX. Coins of northern nations using uncommon characters, as the Runic and German.

"In the modern part no series can be formed of copper that will go back above two centuries; but sequences (chronological series) of gold and silver may be arranged of all the different empires, kingdoms, and states, as far as their several coinages will allow. Those of England and France will be the most perfect. Modern silver is commonly arranged in three sequences; the dollar, the groat, and the penny sizes. The medals of each modern country ought of course to be separated, though it is best to arrange each set in chronological order, let their size of metal be what it will. It may be remarked here, that our modern medals, of the size of a tea-saucer, are only so many monuments of barbarism. The ancient medallions are almost universally but little larger than our crown-piece, though three or four of them may extend to about two inches diameter, but very many modern medals to four inches and more. A large medal always declares an ignorant prince or an ignorant artist. Into the size of a crown-piece the ancients threw more miracles in this way than will ever appear in these monstrous productions."

These directions will likewise apply to the formation of a cabinet of the second kind: but if the collector means to form a series of large Roman brass, he will find the coins of four or five emperors so scarce as not to be attainable in that series, even at any price. He must therefore supply their places with middle brass, and is allowed with regard to Otho: even in the best cabinets, there not being above three coins of that emperor in large brass known in the world; whereas of the middle brass, two or three hundred may exist. For this reason Mr. Pinkerton concludes, that in cabinets of the second class, the collector may mingle the large and second brass together as he thinks proper, in order to save expence; though it would not do so well to unite such disproportionate sizes as the large and small. "In the small sequence, however (says he), there can be no harm in his mixing gold, silver, and brass, as chance or curiosity may lead him to purchase any of these metals. And though your starched bigoted medallist may sneer because such a sequence would controvert his formal and narrow way of thinking, common sense will authorise us to laugh at the pedant in our turn, and to pronounce such a series more various, rich, and interesting, than if the collector had arranged only one metal, and rejected a curious article because he did not collect gold or silver. In like manner, if, in the modern part of the smaller cabinet, any coin of a series is of high price, or of bad impression, there can be no impropriety in putting another of the same reign, which is cheaper, or better executed, though of a different denomination, or of a little larger size. In short, the collector has no rules but in the Greek cities and Roman families, to observe alphabetical order and chronology in every thing else.

### *Tables of Ancient Coins.*

The most ancient coins, according to Froelich, are distinguished by the following marks, which he accounts infallible: 1. Their oval circumference, and globulous swelling shape. 2. Antiquity of alphabet. 3. The characters being retrograde, or the first division of the legend in the common style, while the next is retrograde. 4. The indented square already described. 5. The simple structure of the mintage. 6. Some of the very old coins are hollowed on the reverse, with the image impressed on the front. 7. The dress, symbols, &c. frequently of the rudest design and execution.

### TABLE I. *Ancient Greek Coins.*

1. Those without impression.

2. With one or more hollow indented marks on one side, and an impression in relief on the other. —Of Chalcedon on the Hellespont, Lesbos, Abdera in Thrace, Acanthus in Macedon, those said to belong to Egium in Achaia. This class continues from about 900 to 700 B. C.

3. With an indented square divided into segments, having a small figure in one of them: the rest blank, with a figure in relief on the obverse.—Of Syracuse and other places adjacent. Continue from 700 to 600 B. C.

4. Coins hollow on the reverse, with figures in relief on the obverse.—Of Caulonia, Crotona, Metapontum, &c. Supposed by some to be a local coinage of Magna Græcia; but probably of equal antiquity with the former.

5. Coins in which a square dye is used on one or both sides.—Of Athens, Cyrene, Argos, &c.—Of Alexander I. and Archelaus I. of Macedon. Disused in the reign of the latter about 420 B. C.

6. Complete coins, both in obverse and reverse, occur first in Sicily in the time of Gelo, about 491 B. C.

7. Coins of Alexander the Great and his successors. About the time of this hero the Greek coins began to attain to perfection, and were struck of uncommon beauty. It is remarkable, that on the coins of this monarch his own image seldom occurs. After his death many coins bear his portrait. Trebellius Pollio informs us, that some coins, particularly those of Alexander, used to be worn as amulets; and many medals are met with in cabinets bored seemingly with that intention.

8. Coins of the successors of Alexander.—Those of the Syrian monarchs almost equal the coins of Alexander himself in beauty. Those of Antiochus VI. are supposed to be the most perfect patterns of male beauty to be met with any where. The Egyptian Ptolemies are somewhat inferior.

9. The coins of the Arsacidæ of Parthia done by Greek workmen.

10. The Greek imperial coins, being such as have the head of an emperor or empress; such as have not these impressions being classed with the civic coins, though struck under the Roman

power. None of the imperial coins occur in gold. Of silver there are those of Antioch, Tyre, Sidon, Tarsus, Berytus, Cæsarea. Egyptian silver coins of base metal. Syrian silver coins, which sometimes bear on the reverse the club of Hercules, or the Tyrian shell-fish. Those of Sidon bear the image of the goddess Astarte, or her chariot. Those of Cæsarea in Cappadocia of better work than the Syrian. Lycian coins of good workmanship: on the reverse two harps and an owl sitting upon them. Silver coins of Gelon in Sarmatia resembling the Syrian. The situation of this town is very much unknown. It seems to have been situated on the north of the Euxine sea, where some Sarmatic or Sclavonic tribes were mingled with the Scythians or Goths. The Greek imperial brass coins are very numerous. A series of almost all the emperors may be had from those of Antioch, with a Latin legend on the obverse, and Greek on the reverse. Those of Bithynia and Phrygia remarkable for good workmanship. The coins of Tarsus, remarkable for their curious views of objects, almost in perspective. The Egyptian coins, from the time of Augustus to Nero, are worse executed than afterwards. From Nero to Commodus they are frequently of admirable workmanship, and in a peculiar style, distinct both from the Greek and Roman. From the time of Commodus they decline, and are lost after the reign of Constantius I. The Egyptian brass coins of the Roman period are likewise of excellent workmanship, especially in the time of Antoninus Pius.

TABLE II. *Roman Coins.*

I. The consular coins, called also the coins of families, and arranged alphabetically in cabinets, according to the names of the families which appear on them. They are,

1. *Brass Coins.*—These consist chiefly of large pieces of rude workmanship without any interesting imagery. In cabinets they are generally kept in boxes apart by themselves. The as bears the head of Janus; the semis of Jupiter with S; the triens of Minerva with four cyphers; the quadrans of Hercules with three cyphers; the sextans of Mercury with two cyphers; and the uncia bears the head of Rome with one cypher. In all these pieces the prow of a ship is constantly the figure on the reverse, with very few exceptions. Sometimes, indeed, they have a shell, two heads of barley, a frog, an anchor, or a dog, on the reverse. About the time of Julius Cæsar both the obverses and the reverses of the coins began to be altered.

2. *Silver.*—Of this the denarius was the first and principal coin. It was stamped originally with X, denoting that the value was ten ases. On the reverse was Castor and Pollux, or a chariot of victory. Afterwards the busts of various deities make their appearance; and in the seventh century of Rome the portraits of illustrious persons deceased are met with: but till the time of Julius Cæsar no figure of any living person is to be met with; Julius himself being the first who assumed that honour. The workmanship on the best and worst silver is much the same. The reverses are very curious, and point out many remarkable events in Roman history; but none of these occur till about a century before the Christian era. The large denarii, with ROMA, are the most ancient; and some of these bear the Pelasgic A, not the Roman. The silver sestertii have a head of Mercury, with a caduceus on the reverse. The quinarii have always a head of Jupiter, with a victory on the reverse.

3. *Gold.*—Most of these are of great value. The number of these exceeds not 100; those of brass 200; and of silver 2000. The aureus is the general gold coin; but two or three gold semisses of families likewise occur.

II. Roman imperial coins.

1. *Brass.*—This is of three sizes; large, middle, and small. The first forms a most beautiful series, but very expensive. The various colours of the patina have the finest effect. It is the most important of all the Roman coins, and exceeds even the gold in value.

The middle brass is next in value to the former; and in it are many rare and curious coins, particularly interesting to Britons, as elucidating the history of the island. Of these are the triumphal arch of Claudius; the EXERC. BRITANNICUS of Adrian; the coins of Antoninus Pius, Commodus, Severus, with a victory, VICTORIA BRITAN. but especially those personifying the country BRITANNIA. "The number of Roman coins relating to Britain (says Mr. Pinkerton) is remarkable, more than 20 having been struck at various times; while those personifying Italy, Gaul, Spain, and other regions of the empire, exceed not four or six at most for each country. Only one country vies with Britain, and that is Dacia on the extreme north-east of the empire, as Britain on the extreme north-west. No doubt this circumstance of remoteness in these two countries recommended them to this particular attention, as more expressive of the Roman power.

The small brass series abounds also with curious coins. They are scarce till the time of Valerian and Gallienus, but very common afterwards. Mr. Pinkerton recommends, therefore, to form a series in silver as well as brass; both being the cheapest of all the Roman coins. "In this series (says he) it is a common fault to arrange many coins which have been plated with gold or silver, the forgeries of ancient times, but which time has worn off either wholly or in part. All real brass coins have the S. C. till the time of Gallienus; as the senate alone had the power of striking brass, while the emperor himself had that of gold and silver. When the S. C. therefore is wanting, the coin was certainly once plated; as, in general, the different type and fabric, being those of gold and silver, sufficiently show themselves. With Pertinax, A.D. 192, there is a temporary cessation of small brass; nor after him do any princes occur in that series till Valerian, A.D. 254, excepting Trajanus Decius, A.D. 250 only. After Valerian the series is continuous and common. The brass coinage gradually declined in size from the time of Severus; so that part of the as could not be struck, or at least it was held unnecessary to strike them. Trajanus Decius attempted in vain to restore the coinage; and Valerian and Gallienus were forced to issue denarii ærei and small assaria. The series of large and of middle brass are of two fixed and known sizes; the former about that of our crown, the latter of the half-crown: though after Severus they gradually lessen. But the small brass takes in all parts of the as; and every brass coin not larger than our shilling belongs to this series. The minimi, indeed, or very smallest, it is proper to keep apart. The coins of Julius Cæsar in this size are of peculiarly fine workmanship. They bear his portrait reverse of Augustus, or the reverse has a crocodile EGYPTO CAPTA. There are several with Mark

Antony, and some with Cleopatra; but the more common pieces are those with only numerals on the obverse, which go the length of XIII; probably tickets for the baths. A great many occur in the time of Nero; of which Mr. Pinkerton particularises one which has "on the reverse a table ornamented with griffins and other devices. Upon it is placed a wreath of laurel, and a beautiful vase, of which the embossed human figures are so minute, and finished so surprisingly, as to stamp these coins the most exquisite productions of the ancient mint." From the time of Nero to that of Vespasian no small brass occurs: but there are many of this emperor and of his son Titus; while Domitian has as many as Nero, and Domitia his wife has almost as many. Succeeding emperors to the time of Pertinax have also many brass coins; but from his time to that of Valerian there are no real small brass, excepting those of Trajanus Decius. After Gallienus there are a great many coins of this kind; and Mr. Pinkerton mentions one in Dr. Hunter's cabinet, of an unknown person named Nigrianus. The coin seems to have been struck at Carthage; and our author concludes that he was an African usurper, father to Nigrinianus.

2. *Silver.*—This series is very complete, and the cheapest of any; especially as the small brass becomes a fine supplement to it: the latter being had in plenty when the silver becomes scarce, and the silver being plentiful when the brass is scarce.

3. *Gold.*—The Roman imperial gold coins form a series of great beauty and perfection; but on account of their great price are beyond the purchase of private persons.

4. The *colonial coins* occur only in brass, none, excepting that of Nemausus, having a right to coin silver. They begin in Spain with Julius Cæsar and Antony, and cease with Caligula, who took away the privilege of coinage from the Spanish colonies. The most beautiful are those of Corinth. The other remarkable colonial coins are those of Emerita, Ilice, Terraco, Cassandria, Babba, Berytus, Cæsarea, Patræ, Emisa, Heliopolis or Balbec, Ptolemais, Sidon, Tyre, Deulton, Dium, Troas, Rhesaina, Neapolis of Samaria, which bears a representation of Mount Gerizzim with the temple on it, Hippo in Africa, &c. On many of these coins we meet with fine representations of temples, triumphal arches, gods, goddesses, and illustrious persons. But coins with those representations are by no means common; the colonial coins till the time of Trajan bearing only a plough, or some other simple badge of a colony. Camelodunum is the only colony in Britain of which we have any coins.

5. The *minimi.*—This includes the smallest coins of all denominations, most of which do not exceed the size of a silver penny. They are the most curious of all; but no series of them was ever formed by any person except the Abbe Rothelin, whose collection formed of all metals passed to the queen of Spain. The reason of the scarcity of these small coins is probably their diminutive size; by reason of which they are mostly lost.

It is surprising that numbers of Roman coins are found through all countries once subject to that powerful people. Some have been met with in the Orkneys, and many in the most remote parts of Europe, Asia, and Africa, known to the ancients.

TABLE III. *Coins of other ancient Nations.*

1. The Lydians appear to have invented coinage; though, perhaps, this honour may be disputed with them by the Greeks.

2. The Assyrians, Medes, Babylonians, Phœnicians, and Egyptians, had no coins. In the mouths of the mummies are only thin, unstamped, and round pieces of gold to pay Charon's fare.

3. No Indian or Chinese coins are to be met with till a very late period; and even then so rude as scarce to be worth notice. Voltaire mentions a collection of ancient Chinese and Indian coins made by the emperor of China in 1700; but Mr. Pinkerton supposes it to have consisted only of the Greek and Roman money which had been introduced into these countries.

4. The Lydian coins have no legends; so that mere conjecture only determines the ancient coins of electrum and silver found in Asia, and different from the Persian, to belong to Lydia. Crœsus coined gold into a form which he called staters; and Mr. Pinkerton mentions a very ancient gold coin in Dr. Hunter's cabinet, which he supposes to have been one of these. It has a globous figure, with indented marks on one side, and on the other a man kneeling, with a fish held out in the left hand, and a sword depending in the right. It weighs four drachms; which Josephus tells us was the weight of the Lydian gold coins. In the same collection are other gold coins little inferior in antiquity; the most ancient of which, our author supposes, may have been coined by the cities of Asia Minor, as coinage passed through them to Greece. They are of admirable workmanship, and as much superior to the best Sicilian coins, as the latter are to all the rest in the world. These gold coins are all extremely pale; owing to the want of knowledge in refining gold.

5. Persian coins.—These were first struck by Darius Hystaspes, whence they had the name of darics. They are of gold, and generally have the figure of an archer: they weigh about four drachms; and some occur with the indented mark on one side, while others have figures upon both. The silver coins have generally a king in a chariot of two horses, with a charioteer, and sometimes another figure on foot behind on the obverse; while the reverse presents a ship, sometimes a ram, bull, or other animal. The gold coins, which only had the title of darics, are extremely scarce, having been melted down, as is supposed, and re-coined by Alexander the Great on his conquest of Asia.

There is a second series of Persian coins beginning with Artaxares, or Artaxerxes, who overthrew the Parthian monarchy about the year 210. These are large and thin, with the king's bust on one side and the altar of Mithras on the other; generally with a human figure on each side. These coins continue till the year 636, when Persia was conquered by the Saracens. They have only Persian letters upon them, which have never been explained by any antiquaries. Mr. Pinkerton says that they seem to partake of the ancient Greek, Gothic, and Alanic.

6. The Hebrew shekels, originally didrachms, but after the time of the Maccabees tetradrachms, are almost all forgeries of modern Jews, as well as the brass coins with Samaritan characters upon them. They have all a sprig upon one side and a vase on the other. Mr. Pinkerton says, that the admission of one of them into a cabinet would almost be a disgrace to it.

7. Phœnician and Punic coins are very interesting on account of the great power and wealth of these nations. The alphabets have been cleared

by their relation to the Hebrew and Syriac languages.

8. The coins of Palmyra come under the same denomination with the former, Palmyra being a Syrian city.

9. The Etruscan coins have the characters of that nation, which have been explained by their affinity to the Pelasgic, or oldest Greek and Latin.

10. The Spanish coins are inscribed with two or three alphabets allied to the old Greek or Punic; but the inscriptions have not been sufficiently explained.

11. Gaulish coins.—These are numerous; but the most ancient have no legends; and even after the Greek letters were introduced into Gaul by a colony at Marseilles, the legends are very difficult to be explained.

12. British coins.—From a passage in Cæsar's Commentaries, it has been inferred that the Britons used some kind of coins even in his time. Mr. Pinkerton informs us, that some rude coins of copper very much mingled with tin are frequently found in England; which, he supposes, may be some of the ancient British money. They are of the size of a didrachm, the common form of the nummus aureus among the ancients. After the time of Cæsar, coinage increased among the Britons; and there are many found of Cunobelinus mentioned in the Roman history. Most of these have on one side CUNO, with an ear of wheat, a horse, a kind of head of Janus, or other symbol; and have frequently also the letters CAMU; supposed to mean Camelodunum. Sometimes the word TASCIA occurs; the meaning of which has not yet been explained.

13. Gothic coins of France, Italy, and Spain, to the time of Charles the Great.—These have the Roman characters upon them. The Italian coins are mostly of the size of small brass; and in this way we meet with coins of Athalaric, Theodahat, Witigez, and other Gothic princes. Many others occur, the inscriptions of which, though meant for Roman, are so perverted as to be illegible.

TABLE IV. *Modern Coins.*

1. Of Japan.—These are thin plates of gold and silver, of an oval figure, with small marks or figures stamped on them.

2. China.—These are only copper, about the size of a farthing, with a square hole in the middle to put them on strings. The inscriptions on them do not express the name of the sovereign, but the year of his reign; as the *happy year*, the *illustrious year*, &c.

3. The Tartarian coins are rude, having only inscriptions upon them; and they are all posterior to the time of Jenghiz-khan.

4. Coins of Thibet, Pegu, and Siam, are much the same, presenting only inscriptions without any figures. They are also of late date.

5. India.—Some old coins have been found in the neighbourhood of Calcutta, of gold, silver, copper, and tin, all mixed together. These have commonly a warrior with a sword on one side, and an Indian female idol on the other; of the same form with the celebrated sculptures in the island of Elephanta, but it is impossible to tell what antiquity they are of. The modern coins are the pagoda of gold, worth little more than six shillings; the rupee of silver, upwards of two shillings; and the cash, of copper. There is a remarkable set of rupees, which show the twelve signs; a lion on one, a bull on another, &c. but the occasion on which they were struck is unknown. The other coins of India have generally Persian inscriptions upon them.

6. Persia.—The Persic coins since its conquest by the Arabs continue on the Arabian model.

7. Arabia.—Some coins of the petty princes of Arabia are met with as old as the imperial ages of Rome; but till the time of Haroun Alrashid, no regular coinage appears in the vast empire of the Saracens. Even then the reverse has only an inscription, and the obverse is copied from any Greek or Syrian coin which happened to fall in the moneyer's way. The later Arabian coins are mostly silver, with the name and titles of the prince on one side, and some inscription from the Koran on the other. The more modern coins of this country are in the shape of a fish-hook, with Arabic inscriptions.

8. Turkey.—No regular coinage was formed by the Turks till they became masters of Constantinople. They resemble those of Persia and Arabia, having merely inscriptions on both sides.

9. The coins of the African states, at least such as profess the Mohammedan religion, have merely inscriptions without any figures: those of the internal parts are unknown; and no coinage was used among the Mexicans and Peruvians, the only civilized nations in America; but La Hontan mentions an American savage who had a square medal of copper depending from his neck. Mr. Pinkerton supposes it to have come from Japan.

10. Modern Italic coins.—Besides the Gothic princes mentioned in the former tale, the exarchs of Ravenna coined money with the inscription FELIX RAVENNA, &c. The Lombards issued no coins, but there are some still extant of Charlemagne. The following list shows the origin of the coinage in various Italian states.

Rome.—Papal coinage originates with Hadrian I. Size of silver pennies, with the Pope's name on one side, and Scos PETRUS on the other. No coins appear from 975 to 1099, excepting of Leo IX. In 1303 appear pennies of the senate and people of Rome, with Peter on the one side and Paul on the other. There are groats of Clement V. with his portrait three quarters length; but the side head begins with Sixtus V. in 1470. Gold was first coined by John XXII. in 1316. The coins of Alexander VI. Julius II. and Leo X. are remarkable for beauty and elegance.

Milan.—Coinage began with Charlemagne. The first coin of the family of Visconti occurs in 1330 under Azo. The set finishes with Louis XII.

Naples.—Coinage begins in 840 and 880, with duke Sergius and bishop Athanasius. The next coins are of Roger of Sicily, and Roger II. in 1130, William I. II. and Tancred. Naples and Sicily were subdued in 1194 by the emperor of Germany; in 1255 Manfred appears: in 1266 Charles of Provence; and others till Joan in 1414: after which follow the house of Arragon, and later kings.

Venice begins in the 10th century. The first coins are silver pennies marked VENECI. Then follow the coins of Henrico Dandulo in 1192, of Ziani in 1205, &c. Gold was first coined at Venice in 1280, and copper in 1471; but the silver groats are as old as 1192.

Florence.—Silver was coined here in the 12th century, or before; but in 1252 the first gold coins struck in Europe after the 8th century made their appearance, and were named florins from the flower of the lily upon them. They were imitated by the popes, by France, and England. They have

On one side St. John the Baptist standing, on the other a large fleur de lis, and it is not doubted that the French fleurs de lis took their origin from these coins. They weigh a drachm, and are no less than 24 carats fine according to Italian writers, and are worth about 12 shillings.

Geneva first began to coin money in 1129, under the government of Conrad. Those of the dukes of Savoy began in the same century.

Aquileia.—Coins were issued from this city by the patriarchs from 1204 to 1440.

Ferrara.—Coins of the marquises from 1340.

11. French coins.—During the race of Clovis, from 490 till 751, the coins are chiefly gold trientes, with some solidi and semisses. The former are of good workmanship, with the heads of kings. The reverse has a cross with the name of the town where they were struck.

The coins of the second race begin with Pepin in 751, and continue till Hugh Capet in 987. The coins of the first race are elegant, but those of the second entirely the reverse, being almost all silver pennies, and seldom bearing the portrait of the king. Those of Charlemagne have only CAROLUS in the field; while the reverse bears R. F. or some such inscription; though one piece struck at Rome has a rude bust of him. The coins of Louis le Debonnaire are better done.

The third race begins with Hugh Capet in 987, and extends to this time. The coinage did not begin to improve till 1226 under St. Louis, when the groat appears. Its name in Italian is grosso, in French grosse, in English groat, or great coin; so called from its size in comparison with the penny; and it passed from Italy to France, to Germany, and to England. After the conquest of France by the English, base coins of many kinds were introduced; and in the year 1574, in the time of Henry III. copper was first introduced into the French coinage. Besides these, the other remarkable coins of France are, the blancs or billon groats, first issued in 1348; the ecus à la couronne, or crowns of gold, so called from the crown on one side, and begun by Charles VI. in 1384: those of Ann of Bretagne in 1498: the teston, or piece with the king's head, of Louis XII.; the henri of Henry II. with Gaul sitting in armour, and a victory in her hand. There are many coins of cardinal Bourbon, elected king in 1589; and in 1642, Louis XIV. takes the title of CATALONIÆ PRINCEPS. The first louis d'or made its appearance in 1640; but such was the poverty of France, if we believe certain authors, that in 1719 the duke of Orleans regent struck copper for silver.

12. Spanish coins.—The most early series of these consists almost entirely of trientes, finely done. On one side they have the head of the king with his name, and on the other a cross, with the name of the town, commonly in Bœtica, or the south part of Spain, where there were a great many Roman colonies, and which was fertile to a proverb. The Moresque coins of Spain, like those of the rest of the Mohammedan states, present us only with insipid inscriptions on both sides. Indeed the Mohammedan religion, by its absolute refusal to allow the representation of any living creature, has prevented the progress of coinage in any degree throughout those regions which it has overspread. The inscriptions on the ancient Spanish coins are in the Cufic or old Arabic characters.

13. Portugal.—No description of the coins of this kingdom has yet appeared.

14. Germany.—No account of the German coins has been published; though it is well known that not only the emperors, but many of the cities, particularly those called Hanse-towns, issued money; and many of the coins issued by the cities were superior in elegance even to those issued by the emperors.

15. Denmark.—Here the coinage begins with Canute the Great in 1014. The pieces are at first extremely rude, ornamented only with rings and Runic characters. These are succeeded by copper pieces, some of which have a cross, others a pastoral staff on one side, with the letter A on the other. Later coins have strokes 1111, &c. all round them; but those of Harold, Hardicanute, and Magnus Bonus, in 1041, are of neat workmanship, and have the portraits of the princes at half-length. The coins of Nicholas or Niel, as he is called by the Danes, are rude, as well as those of Waldemar I. and the celebrated Margaret. In 1376 Olaf caused money to be struck with a grinning full face, with a crowned O upon the other side. "The Swedes (says Mr. Pinkerton) took these coins extremely ill, as they thought they grinned at them." Silver was first coined in Denmark by Philippa queen of Eric, and daughter to Henry IV. of England.

16. Sweden.—The coinage of this kingdom began in 818 under Biorno, on the plan of Charlemagne. These coins are marked with a cross. Next follow those of Olaf in 1019; which Mr. Pinkerton supposes to have been the first true Swedish coins; and that the art of coinage first passed from England into Denmark in the time of Canute the Great, and from Denmark into Sweden. These coins were struck on the English model. During the time that Sweden was subject to Denmark, or miserably harassed by the Danes, the coins of both kingdoms were the same; but after the time of Gustavus Vasa many elegant pieces appear. In 1634, dollars were coined with the portrait of Gustavus Adolphus, who was killed two years before: on the reverse they have the arms of Sweden, with the chemical marks of mercury and sulphur. In 1716, 1717, and 1718, Charles XII. being in extreme want of money, issued small copper coins with Saturn, Jupiter, Mars, &c. upon them, to go for dollars; and on account of this scheme, Baron Goertz, the suggester of it, was brought to the block.

17. Norway.—The coins of this country begin with Olaf in 1006; after which time there are various coins of other princes; but copper was not coined till the year 1343.

Besides the coins already mentioned, there are ecclesiastic coins of France, Germany, Denmark, Sweden, Norway, &c. Those of Denmark and Sweden are numerous, but the Norwegian coins of this denomination are rare. Mr. Pinkerton describes a silver one in his possession as having arms and a mitre, with the inscription on one side SANCTUS OLAWS REX NORVEY; on the reverse OLAWS DEI GRA. ARCEP. NID'SEN, meaning NIDROSIENSIS, or Archbishop of Nidros, now Drontheim.

18. Bohemia.—The coinage of this kingdom appears at a very early date, viz. in the year 909, under duke Boleslaus I. These coins are followed by others of Boleslaus II. and Emma his wife in 970; of Boleslaus III. in 1002; Jaromir in 1020; Udalrich in 1030, and other princes. The *bracteate* money of Ottocar I. was coined in 1197.

19. Poland.—The coinage of this country is nearly as ancient as that of Bohemia. The coins are on the German model, but no particular account of them has been published.

20. Russia.—None of the Russian money appears to be more ancient than the 13th century. The first are the kopecks or silver pennies, which have upon them rude figures of animals on one side, and a man standing with a bow or spear on the other. There are likewise coins of Moscow struck by Aristoteles the architect in 1482. The roubles or dollars and their halfs. There are some of the impostor Demetrius in 1605, which are very scarce.

21. Prussia.—The first Prussian coins were struck at Culm by the Teutonic knights in 1280. They were silver pennies, and upon the German plan. In the next century were struck shillings, groats, and schots; the last were the largest, and are extremely rare. They have the Prussian shield, an eagle surmounting a cross, with a rose-shaped border, MONETA DOMINORUM PRUSSIÆ: on the reverse is a cross fleurie, within a border of a similar kind, having the inscription HONOR MAGISTRI, JUSTITIAM DILIGIT.—Gold coins were struck in the same century. In the time of Copernicus the money was so debased, that 12 or 13 marks were worth but one of pure silver.

22. England.—The English coins are of various kinds.

1st. Heptarchic.—These are only of two sorts, viz. the skeatta or penny of silver, and the styca of copper. Few of the pennies appear till after the year 700; though some are met with which bear the name of Ethelbert I. king of Kent, as old as 560. At first they had only rude figures of serpents, but in later times legends were likewise added. Most of their pennies have pagan symbols upon them. The styca was only coined in Northumberland, and was a very small piece about the value of half a farthing.

2d. Coins of the chief monarchs of England. Mr. Pinkerton denies that an end was put to the heptarchy by Egbert in 832, as is commonly supposed; though he owns he was chief monarch of the country, as several others had been before him. Edgar, who reigned in 959, according to him was the first king of England; and the coins of the chief monarchs form almost a complete series from the time of Egbert to Edgar. The only chief monarch of whom there are no coins is Ethelbald, who reigned in 857. Most of these coins bear rude portraits; but the reverses are sometimes curious and interesting. Some have views of cathedrals and other buildings; particularly one of Edward the Elder in 900; which has the cathedral of York with three rows of windows, round arched as the other Saxon and Norman buildings; the Gothic arch being quite unknown till after the 12th century. Some coins of Anlaf king of Northumberland have the famous raven, the Danish ensign; and those of other princes have frequently very curious reverses.

3d. Ecclesiastic coins appear of the archbishops of Canterbury, Wulfred, in 804, Ceolnoth in 830, and Plegmund in 839.

4th. Coins of the kings of England. The silver penny, which had begun during the heptarchy, continued to be the general coin after the kingdom had been united under one head; and extends in a continued series from Egbert almost to the present reign. The only kings wanting are Edmund Ironside, Richard I. and John. At first the penny weighed $22\frac{1}{2}$ grains; but towards the close of the reign of Edward III. it fell to 18 grains; and in that of Edward IV. to 12. In the time of Edward VI. it was diminished to eight grains; and in queen Elizabeth's reign to $7\frac{31}{31}$; at which it still continues.

Halfpennies and farthings were first struck in silver by Edward I. in 1280; the former continued to the time of the commonwealth, but the latter ceased with Edward VI. The groat was introduced by Edward III. in 1354, and continues to this day, though not in common circulation. The half-groat or twopence is of the same date, and also continues to the present time.

Shillings were first coined by Henry VII. in 1503. At first it was called testoon, from the teste, tete, or head of the king upon it; the name shilling being derived from the German schelling; under which appellation coins had been struck at Hamburg in 1407. The crown was first coined in its present form by Henry VIII. Formerly it had appeared only in gold, whence the phrase of crowns of gold; though these indeed were the largest gold coins known for a long time in France and other countries on the continent, being worth about 10s. sterling. They had their name from the crown stamped on one side, and were first coined by Charles VI. in 1384, and continued till the time of Louis XIV. The half-crown, sixpence, and threepence, were coined by Edward VI. In 1558 queen Elizabeth coined three-halfpenny, and in 1561 three-farthing, pieces; but they were discontinued in 1582. From the year 1601 to the present time the coins of England remain the same.

Gold was coined in England by Henry III. in 1257; the piece was called a gold penny, and was larger than the silver one; and the execution is by no means bad for the time. The series of gold coinage, however, commences properly from Edward III. In 1344 this monarch first struck florins, in imitation of those in Italy; and it is remarkable, that though these coins at the time they were first issued bore only six shillings value, they are now intrinsically worth 19s. so much has the value of gold increased since that time. The half and quarter florin were struck at the same time, but only the last has been found. The florin, however, being found inconvenient, gave place to the noble of 6s. 8d. value, and exactly half a mark. The latter had its name from being a limited sum in accounts; and was eight ounces in weight, two-thirds of the money pound. It is sometimes also called selibra, as being one half of the commercial pound of 16 ounces. The noble had its name from the nobility of the metal; the gold of which it was coined being of the finest sort. Sometimes it is called rose noble, from both sides being impaled in an undulating circle. It continued with the half and quarter noble to be the only gold coin till the angels of Edward IV. appeared in 1465. These had their name from being stamped with the image of Michael and the dragon. The angelites of 3s. 4d. value were substituted in their place. In 1527 Henry VIII. added to the gold coins the crown and half-crown at their present value; and the same year he gave sovereigns of 22s. 6d. and royals of 10s. 3d. angels at 7s. 6d. and nobles at their old value of 6s. 8d. In 1546 he caused sovereigns to be coined of the value of 20s. and half sovereigns in proportion. His gold crown is about the size of our shilling, and the half-crown of sixpence, but thin. All his coins, however, gold as well as silver, are much debased; and it was not without much labour and trouble that Edward VI. brought it back to its former standard. On the union of the two crowns, James gave the sovereign the name of unite; the value continuing of 20s. as before. He coined also rose-ryals of 30s. value, spur-ryals of 15s. angels of 10s.

and angelets of 5s. Under the commonwealth, the sovereign got the name of the twenty shilling piece, and continued current till the coinage of guineas. These were so called from their being coined of Guinea gold, and were at first only to go for 20s. though by an universal but tacit consent they always passed for 21s. Half-guineas, double guineas, and five guinea pieces, were also coined during the same reign; which still continue, though the two latter are not in common circulation. Quarter guineas were coined by George I. and likewise by his present majesty; but they were found so troublesome on account of their small size, that they were stopped within a year or two when received at the Bank of England; and thus are not to be met with at present. A few pieces of 7s. value have likewise been coined, and are known by the lion above the helmet; but none were then issued. In 1688 the guinea rose to 21s. 6d. and continued to increase in value till 1696, when it was as high as 30s. but after the recoinage in 1697 and 1698 it fell by degrees, and in 1717 was at its old standard of 21s. and at that time silver was fixed at its present standard value, viz. as one to 15½ in weight.

Though the first money coined in Britain, as we have already observed, was copper, yet, excepting the Northumbrian stycas, no copper coin was found in England from the time of the Saxon conquest till the year 1672. An aversion to a copper coinage, it seems, was prevalent throughout the nation; and queen Elizabeth, who without hesitation used base money for Ireland, yet scrupled at coining copper for England. This want of small coin occasioned such an increase of private tokens for halfpennies and farthings, that it became a serious object to government; and in 1594 a copper coinage was seriously thought of. This year a small copper coin was struck about the size of a silver twopence, with the queen's monogram on one side, and a rose on the other; the running legend on both sides being THE PLEDGE OF A HALFPENNY. Of this there are patterns both in copper and silver, but both of them soon fell into disuse. On the 19th of May 1613, king James, by royal proclamation, issued farthing tokens. They are generally of the same size with the twopence, with two sceptres in saltier surmounted with a crown, and the harp upon the other; with an intention, as it would seem, that if they were refused in England they might pass in Ireland. In 1635 Charles I. coined those with the rose instead of the harp; but the circulation of these was entirely stopped by the vast number of counterfeits which appeared, and by the king's death in 1648. After this the private tokens began again to circulate, till put a stop to by the coinage of farthings in 1672. The workmanship of the tokens is quite contemptible. In 1672 the halfpence as well as the farthings which had been struck two years before began to circulate. They were of pure Swedish copper, the dyes engraved by Roettier; and they continued till the year 1684, when some disputes arose about the copper lately obtained from the English mines. Tin farthings were coined with a stud of copper in the centre, and inscribed round the edge as the crown pieces, with NUMMORUM FAMULUS, 1685 or 1686. In 1685 halfpence of the same kind were coined; and the tin coinage continued till the year 1692, to the value of more than 65,000l. but next year the tin was all called in by government, and the copper coinage recommenced. The farthings of queen Anne are all trial pieces, excepting those of 1714, the last year of her reign. They are (says Mr. Pinkerton) of exquisite workmanship, exceeding most copper coins either ancient or modern, and will do honour to the engraver, Mr. Croker, to the end of time. The one, whose reverse is peace in a car, PAX MISSA PER ORBEM, is the most esteemed; and next to it the BRITANNIA under a portal. The other halfpence and farthings are less valuable.

23. Scotland.—Silver pennies of Alexander I. who reigned in 1107, are believed to exist; and there certainly are some of Alexander II. in 1214. There are likewise coins of David in 1124, but perhaps none of Malcolm IV. his successor, whose reign was very short. There are many coins of William I. in 1165, and a large hoard of his pennies was found at Inverness in 1780.

The money of Scotland continued to be of the same value with that of England till the country was drained by the vast ransom of David II. after which it became necessary to reduce its size; and so much did this diminution affect England, that Edward III. found himself obliged to lessen the English coin also. The diminution of the Scottish coin, however, continued still to go on until it became impractible to keep par with that of England. In the first year of Robert III. it passed only for half its nominal value in England: in 1393 Richard II. ordered it only to go for the weight of the genuine metal it contained. In 1600 it had sunk to such a degree as to pass only for a twelfth part of the English money, and continued at that low ebb till the coinage of Scotland was entirely cancelled by the union of the two kingdoms.

Of silver coins we have only pennies till the year 1293, when Edward I. having coined halfpence and farthings, Alexander III. of Scotland coined also halfpence, of which we have a few, but no farthings are to be met with; but there are silver farthings of Robert I. and David II. The latter introduced the groat and half-groat, which completed the set of Scottish silver. It continued unaltered till the time of queen Mary, when they all ceased to be coined in silver, on account of the high price of that metal. In 1553 shillings were first coined, with the bust of the queen on one side, and the arms of France and Scotland on the other. The silver crown was first coined in 1565, which went for 30s. Scots; lesser pieces of 20s. and 10s. having likewise been struck, and marks of silver worth 3s. 4d. English, were also coined about the same time. These coins have upon them the marks XXX. XX. X. to denote their value. They are commonly called Cruickstone dollars, from the palm-tree upon them, mistaken for a remarkable yew at Cruickstone near Glasgow, where Henry Darnley resided. It is described, however, in the act as a palm, with a shell-padoc (a tortoise) crawling up. This alludes to Darnley's marriage with the queen, as the motto from Propertius, DAT GLORIA VIRES, also implies. The motto NEMO ME IMPUNE LACESSET first appears on the Scottish coins in 1578, and the invention is given to the celebrated Buchanan. In 1582, the crown of an ounce weight went for 40s. Scots, and was accordingly marked XL. in 1597 the mark was L. the Scottish money being then only one-tenth of the English: the mark was LX. in 1601, the value being then reduced to one-twelfth, at which it has ever since continued. In the time of Charles I. half marks, 40 and 20 penny-pieces, were coined.

In 1675 the Scottish dollars first appeared, in value 56s. Scots, with halves and quarters of proportional value. In 1686 James VII. coined 60, 40, 20, 10, and 5s. pieces; but only those of 40 and 10s. are known, with these numbers under the bust. At the union of the kingdoms all the Scottish coins were called in, and recoined at Edinburgh, with the mark E under the bust to distinguish it; since which there has been no coinage in Scotland. The Scottish silver coins are in general equal, if not superior, in the workmanship to the English.

Gold was first issued by Robert II. about 30 years after Edward III. of England had coined the same metal in that country. The pieces were at first called St. Andrews, from the figure of that tutelar saint upon the cross, and who appears on the obverse with the arms of Scotland, and on the reverse a lion in a shield. The lion was another name for the largest gold coin in Scotland, from the arms of the kingdom upon it. The next was the unicorn, under James III. which were followed by the bonnet-pieces of James V. These last are of admirable workmanship, being almost equal to the ancient coins in this respect. In imitation of the French, the monarch we speak of diminished the size of the coin without lessening its weight; an improvement not adopted by the English for a whole century. The last gold coined in Scotland was the pistole and half pistole, of twelve and six pounds Scots. These coins have the sun under the head. The gold coins of Scotland fell in the same proportion with the silver.

The copper coinage of Scotland is of more early date than that of England. It was preceded by money of billon, or copper washed with silver, called black money. James III. first coined black farthings in 1466; and this is recorded by historians as one of his greatest faults. This kind of coinage, however, continued as late as the reign of James VI. In his time the true copper coinage began; but as the value of Scottish money was now declined almost to the utmost, the pieces suddenly assumed a form almost resembling that of the French coins. The bodle, so called from Bothwell the mintmaster, being equal in size to the liard, and worth two pennies Scottish, was struck. The billon coin, formerly called bas-piece, and worth six pennies Scots, was now coined in copper, and termed the baw-bee. Thus it corresponded with the French half sol and English halfpenny, the Scots penny being now equivalent to the French denier. Some pieces named Atkinsons were coined by James VI. in 1582, when the Scottish money was to the English as 1 to 8; but on its being still farther reduced, they went for eight pennies, a third more than the value of the baw-bee. Besides these there were the hardie and plack, the former being worth three and the latter four pennies Scots. This coinage continued through the reigns of Charles I. and II. but Scottish coins of the former are, perhaps, the scarcest of any.

24. Ireland.—The first coins introduced into this kingdom seem to have been those of the Danes, and which have only a number of strokes around them instead of letters. In the tenth century, however, this coinage had been considerably improved; and in 930 and 994 there are pennies struck in Dublin, with the inscription on Dvfli or Dyfli, *Duflin* or *Dyflin* being the Danish name of that city. There are likewise coins of the Irish princes themselves, and of the English monarchs, struck in Ireland as early as the ninth century; and it is asserted by some, that Ireland even in these days had been conquered by England; of which, indeed, these coins seem to be a proof. None of the Irish coins of Henry II. are to be met with, but we have some of the coins of John; and from his time to that of Henry V. the Irish coins are known by a triangle inclosing the king's head, which appears also upon the coins of other nations at this period. The harp does not appear upon the Irish coins till the time of Henry VIII. Till the time of this monarch, the English and Irish coins are the same; but the same debasement of the coin which at that time took place in England extended also to Ireland; but in 1601 copper halfpence and farthings were coined also for this kingdom. These circulated in Ireland when James VI. issued his farthing tokens of copper, the latter being of two sizes, that if they failed in England they might be sent to Ireland as pennies and halfpence. In 1635 a mint was established in Dublin by Charles I. but it was stopped by the Irish massacre, and the many disturbances which followed; since which time the scheme has not been resumed. After the massacre, St. Patrick's halfpence and farthings were coined by the papists, bearing the legends Floreat Rex, and on the reverse Ecce Grex; on the farthing Quiescat Plebs. Copper tokens were struck by towns and tradesmen, as in England and Scotland. In 1680, halfpence and farthings were issued by authority, with the harp and date. In 1689, James II. having invaded Ireland, instituted a mint, and coined shillings and half-crowns of all the refuse metal he could find, particularly some brass guns were employed, whence the coinage is commonly called gun-money. Even this metal, however, soon became so scarce, that a diminution in its size is quite apparent from June 1689 to July 1690; and as the month of their mintage is marked upon them, this decrease is easily perceived. In March 1690, pennies of lead mixed with tin were issued; and on the 15th of June the same year, crowns of white metal were coined; but these are now very scarce. In 1722, the patent for coining halfpence and farthings was given to William Wood, which excited such discontent in Ireland. From the small size allowed by the patent to these pieces, it was supposed that the patentee would have gained 60,000l. but as he caused them to be struck of a size still smaller, his gains were estimated at 100,000l. The coins, however, are of admirable workmanship, and very fine copper, bearing the best portrait of king George I. to be found any where. Sir Isaac Newton, at that time at the head of the mint, declared that they were superior to the English coins in every thing except the size. In 1737 the Irish halfpence and farthings, with the harp on the reverse, were coined, and continue to the present time. In 1760 there was such a scarcity of copper coin, that some private persons applied for leave to coin halfpence, which appeared with a very bad portrait of George II. and the words Voce Populi around it. No gold or silver has been coined in Ireland since the massacre of 1641.

Table V. *Modern medals, properly so called.*

1. Scottish medals.—These take the lead in the present article, the first modern medals of gold being those of David II. struck between the years 1330 and 1370. Only two of them now exist; one in the collection of Mr. Barker of Birmingham, and the other in that of Dr. Hunter.

In 1478 there is a medal of James III. sent to the shrine of St. Ambroise in France. It is described as of two inches and a third in diameter; the weight near two ounces; having on the obverse a beardless king, with long hair, sitting on a throne, holding in one hand a naked sword; in the other a shield, with the Scottish arms. On the borders of the canopy above the throne is an inscription in Gothic letters, IN MI DEFFEN, being corrupt French for *In my defence*; a common motto in the Scottish arms. Above the canopy is VILLA BERWICI: the reverse bears St. Andrew and his cross, SALVUM FAC POPULUM TUUM, DOMINE. There is also a medal of James IV. in the collar of St. Michael, having on the reverse a Doric pillar surmounted by a young Janus, standing on a hill, beyond which is the sea, and land on either side. This, however, is by some suspected to be a forgery.

The most remarkable Scottish medals are those of the unfortunate Mary. The first is properly French, having been issued at her coronation as queen of France, along with her husband king Francis II. On the obverse of this piece there are portraits of Francis and Mary, face to face, with three legends around them, the outermost containing their titles; the middle one the following sentence: HORA NONA DOMINUS J. H. S. EXPIRAVIT HELLI CLAMANS; the innermost the name of the city (Paris). On the reverse are the arms of France and Scotland. Fine testoons were also coined upon the same plan, and are now so rare that Dr. Hunter gave ten guineas for one he had in his collection. The same portraits appear on the fine crown of Mary and Henry, in 1565, which is so rare as to be esteemed a medal of the highest value; and Mr. Pinkerton imagines, that if brought to a sale it would bring 40 or 50 guineas.

Another remarkable medal of Mary represents her full faced, and weeping, with the inscription, O GOD GRANT PATIENCE IN THAT I SUFFER VRANG. The reverse has in the centre, QUHO CAN COMPARE WITH ME IN GRIEF? I DIE AND DAR NOCHT SEEK RELIEF; with this legend around, HOURT NOT THE (figure of a heart) QUHAIS JOY THOU ART. There are also many counters of this unfortunate princess, being thin silver pieces of the size of a shilling. "They all appear (says Mr. Pinkerton) to have been done in France by Mary's direction, who was fond of devices. Her cruel captivity could not debar her from intercourse with her friends in France, who must with pleasure have executed her orders, as affording her a little consolation."

The coronation medal of Charles I. struck at Edinburgh for his inauguration, June 18, 1663, is remarkable, as being the only one ever coined of Scottish gold, and the first in Britain struck with a legend on the edge. With respect to the workmanship, it is inferior to Simon's. Of these medals only three are known to exist, of which one is in the Museum. It is not uncommon in silver; in which case it sometimes wants the legend on the edge.

2. Italian medals.—These appear in the 15th century, and from that time successively in most European countries. Vittore Pisano, a painter of Verona, is celebrated as the restorer of the art; but it remains to be accounted for how the medals of king David already mentioned came to exist so long before. Mr. Pinkerton considers this artist rather as an inventor than a restorer, his medals having no resemblance to the ancient coins, as being large, and all cast. They were first modelled in wax, then a mould taken from the model in fine sand, and other ingredients. After a good cast was procured, it was touched up, and made a model for the rest. These medals of Pisano are almost always inscribed *Opus Pisani Pictoris*. The portraits of a great number of illustrious men were done by him in this manner; and in the British Museum is a large brass medal of Pisano by himself.—Other artists were Boldu, Marescotto, Matthæus de Pastus, Sperandes, Misaldone, &c. Towards the end of the century, however, the medals began to assume a more elegant appearance; and the papal ones are not only the most elegant but the most ancient series of all the modern medals. The improvement began in the reign of Alexander VI. so famous for his own crimes, and those of his nephew Cæsar Borgia. His successors, Julius II. Leo X. Hadrian VI. and Clement VII. had many of their medals designed by Raphael, Julio Romano, and other eminent painters, and the engraving executed by artists of equal merit. Among these were the celebrated Cellini, and the noted Paduan forgers of Roman coins, Cavino and Bassiano. In 1644 Cormanni, a medallic artist, was imprisoned on account of a piece which represented the Pope upon one side, and Olympia Maidalchina, the relation of his holiness, on the other. The unfortunate Cormanni poisoned himself. About this time the family of the Hamerani, originally from Germany, began to engrave the papal medals; which they did with surprising merit for several generations. Each of the daughters did a fine medal, as we are informed by Venuti.

Besides the papal medals, there are many issued by the various states of Italy. There are medals of Frederic II. of Sicily in 1501, of several Venetian generals in 1509, of Alfonso duke of Ferrara in 1511, and of the celebrated Andrew Daria in 1528.

3. French medals.—Till the reign of Louis XIV. the medals of this country are neither fine nor numerous; but this monarch exceeds all modern princes in this way. Many of his pieces are well designed and executed, though objectionable on account of their falsehood.

4. Danish medals.—These appear of Christian II. in 1516, of Frederic and Sophia in 1532, of Frederic I. and Christian III. in bonnets worn in the sixteenth century. The elephant of the house of Oldenburgh is frequent upon Danish medals.

5. Swedish medals.—These begin with Gustavus Vasa; and several of Christina are likewise to be met with. There are also some curious ones of Charles XII.

6. Dutch medals.—These begin in 1566; and many of them are remarkable for maps and plans, which must be very interesting to posterity. "Had the Greeks and Romans (says Mr. Pinkerton) given us maps and plans, what a fine system of ancient geography and topography a cabinet of medals must have been!"

7. Medals of Spain, Portugal, and Germany.—The Spanish medals begin with Gonsalo in 1503; many of which are curious and interesting. Under Charles V. there are many curious Spanish medals, but those in Germany begin with Frederic in 1453. They are extremely numerous; as we may easily suppose from the greatness of the empire, and the various states which compose it. There is a famous medal of Sebastian king of Portugal, famous for his unfortunate expedition into Africa in 1578; with his bust, full face, and three quarters in

length. On the reverse is a shell-fish in the sea, with the moon and seven stars, bearing the inscription SERENA CALSA FAVENT. There is also a curious lozenge-shaped coin of the same with the arms of Portugal, and the king's name and title: On the reverse is a cross with the inscription IN HOC SIGNO VINCES, 1578.

8. Satiric medals.—These began almost as soon as the knowledge of the art of coining medals was revived. They seem to have been almost unknown to the ancients. One indeed of the emperor Gallienus is supposed to have been satiric. It has on the front the emperor's bust, with the inscription GALLIENÆ AUG. the reverse is Peace in a car, PAX UBIQUE; but this has been proved to be only a blundered coin. Some other ancient medals, however, are not liable to this objection. The first modern satiric medal published was that of Frederic king of Sicily in 1501, against his antagonist Ferdinand king of Spain. It has on one side the head of Ferdinand with the inscription FERDINANDUS R. AR. VETUS VULPES ORBIS; on the reverse a wolf carrying off a sheep, JVGVM MÆVM SVAVE EST, ET ONVS MEVM LEVE. Many others have been struck, of which the wit would now perhaps be difficult to be found out: but of all nations the Dutch have most distinguished themselves in this way; and paid very dear for their conduct, as they brought upon themselves by one or two satiric medals the whole power of France under Louis XIV.

9. English medals.—The first of these is in the duke of Devonshire's collection. It is of a large size, and done on the plan of the early Italian medals. It has on the reverse the arms of Kendal, with the inscription TEMPORE OBSIDIONIS TURCORUM, MCCCCLXXX. On the other side is a portrait with 10. KENDAL RHODI TVRCVPELLERIVS. It was found last century in Knaresborough forest; but Mr. Pinkerton has no doubt of its having been done in Italy. The next is that of Henry VIII. in 1545, and is of gold, larger than the crown-piece, with the king's head upon the obverse, and three legends within each other, including his titles, &c. The reverse contains two inscriptions, declaring him to be the head of the church; the one in Hebrew, the other in Greek. It was imitated exactly by Edward VI. whose coronation medal is the first we have. There are two medals of Philip and Mary, whose execution is tolerably good; but those of Elizabeth are very poor. There are good medals of James I. and his queen; with a fine one of Charles I. and Henrietta, though the workmanship is much inferior to the antique. There are many good medals of Charles, with various devices upon their reverses. Under the commonwealth the celebrated Simon produced medals which are deservedly reckoned the most admirable pieces of modern workmanship. There are many good medals of Charles II. James II. and William III. Some are also found of James after his abdication. Some fine gold, silver, and copper medals, were issued in the time of queen Anne; the two last affording a series of all the great actions of the duke of Marlborough. About the year 1740, a series of medals was engraved in London by Dassier, a native of Geneva, containing all the kings of England; being 36 in number. They are done upon fine copper, and executed with great taste. There are besides many medals of private persons in England; so that it may justly be said, that this country for medals exceeds almost every other in Europe.

To this account of modern coins and medals we shall add that of another set called *siege-pieces*, and which were issued during the time of a siege in cases of urgent necessity. These were formed of any kind of metal; sometimes of no metal, and Patin mentions a remarkable one struck at Leyden in 1574, when the place was besieged by the Spaniards. It was of thick paper or pasteboard, having a lion rampart, with this inscription, PVGNO PRO PATRIA, 1574; and on the reverse, LVGDVNVM BATAVORUM. There are various siege-pieces of Charles I. both in gold and silver, some of the latter being of the value of twenty shillings.

The *nummi bracteati* are a species of modern coins somewhat between counters and money; and have their name from the word bractea, a spangle or thin bit of metal. They are commonly little thin plates of silver, stamped as would seem with wooden dies upon one side only, with the rude impression of various figures and inscriptions. Most of them are ecclesiastic, and were struck in Germany, Switzerland, Denmark, Sweden, Norway, and a few in Poland. They continued to be in use in Germany till the end of the fifteenth century, and some are still used in Switzerland at this day.

*Table of Abbreviations used in the Legends of Medals;* from Mr. Pinkerton.

*Greek Coins.*

A

A. Athens, Argos, Aulus, Asylum; primi or first; as Εφεσιων Α Ασιας, "Ephesians, first people of Asia"
A. Abbassus, Abdera, Abydus on Hellespont
AB. Abydus in Egypt
ABΥ. Abydus on Hellespont
AΘ. AΘE. Athens
AIΓ. Aegina
AIΓOΣΠO. Aigospotamos
AIA. Aelius, Aelia Capitolina
AIN. Aenos
AK.—AKPAΓAN. Agrigentum
AKI. Acilium
AKT. Actium
AΛE. Alexandria
AM. Amyntas
AMBP. Ambracia
AMΦI. Amphilochia
ANΘ. Ανθυπατον, Proconsul
ANTIΣ. Antissa
ANA. Anactoria
ANTI. Antium
AN. Ancyra
ANT. Antoninus, Antioch
AΞ. Axus in Crete
AON. Aonitæ
AOΥE. Avenio, *Pell.*
AΠ. Appius
AΠA. Apamea
AΠO. Apollonia
AΠTA. Aptara
AP. Aradus, Harma
APΓE. Argennos
APΓ. Argos
API. Aricanda
APIM. Ariminum
APΣI. Arsinoe
APΥ. Aryca
APX. Αρχιερευς or Αρχον, high priest or magistrate
AΣIAPX. Asiarchæ, presidents of the games of Asia *

* There were also Syriarchæ, Lyciarchæ, Galatarchæ, Bithyniarchæ, Cappadociarchæ, &c. *Morel. Spec.*

AΣ. Asylum
A. Σ. Πρωτι Συριας, First of Syria
AΣK. Ascalon
AT. Atabyrium
ATAP. Atarnæ
AΥΓ. Augustus
AΥPHΛ. Aurelius
AΥ. AΥT. Αυτοκρατωρ, Emperor
AΥTON. Αυτονομοι, enjoying their own laws
AΦI. Aphyta
AΦP. Africanus
AX. Achaii

B

B. Βουλης, Council: Berytus: Bithynia
BAΓHΔAO. Bagadaonia
BAΛ. Valerius
BH. Berytus
BITON. Bitontum
BOI. Bœotia
BPΥN. Brundusium
BΥ. Byzantium

Γ

Γ. ΓP. ΓPAM. Grammaticus, or keeper of the records
Γ. Gaius, or Caius
ΓA. Gallus, Galerius, Gallienus
Γ. Γνωριμου, Illustrious
ΓEΛ. Gelas
ΓEP. Germanicus
ΓN. Gneius
ΓOPTΥ. Gortyna
ΓPA. Gravisca

Δ

Δ. Decimus, Dymæ
ΔAK. Dacicus
ΔAM. Damascus
ΔAP. Dardanum
ΔH. Δημος, the people
ΔHMAPX. EΞOΥΣ. with Tribunitian power
ΔE. Decelia
ΔEK. Decius
ΔEP. Derbe in Lycaonia
ΔH. Delos
ΔI. Diospolis
ΔPE. Drepanum
ΔΥP. Dyrrachium

E

E. Eryce
E. EPEΣ. Eresus
EΛEΥ. Eleusis
EΛEΥΘ. Ελευθεροι, Free
EΠI. Epidaurus
EPI. Eriza in Caria
EPX. Erchia
EPΥ. Erythræ
ET. ETO. Ετους, Year
ET. Etenna in Pamphylia
EX. Εχουσια, Power
EΥ. EΥBO. Eubœa
EΥΣ. Ευσεβης, Pious
EΥT. Ευτυχης, Happy
EΦ. EΦE. Ephesus

Z

ZA. Zacynthus
ZANKΛ. Zancle, Messana anciently so called

H

H. Elium
HΓ. Ηγεμονος, President
HPAK. Heraclea

Θ

ΘA. Thasus
ΘE. Thespiæ
ΘEΣ. Thessalonica
ΘH. ΘHB. Thebæ

I

I. IEP. Ιερας, Sacred
IEPAΠΥ. Hyerapytha
IKAP. Hiccara
IΛI. Ilium
IOΥ. Iulis a city, or Julius
IOΥΛ. Julia
IΠA. Hippana
IP. Irene Ins. *Pellerin.*
IΣ. Isus, Istiæa

K

K. Caius; Κουιντος, Quintus
K. KAIΣ. Cæsar
K. K. Κοινον Κιλικιας, Community of Cicilia
KAIΛ. Cælius
KAΛ. Chalcedon
KAΛΛI. Callipolis
KAMA. Camara
KAN. Canata
KAΠ. Capua
KAΠΠ. Cappadocia
KAP. Carrhæ
KAPΓ. Carthago
KAΥ. Caulonia
KE. Ceos
KEΦ. Cephalædis
KI. Cianus, Cibæum
KIΛ. Cilbiani
KΛ. Clæonæ, Claudius
KΛA. Clazomene
KNI. Cnidus
KO. Corinth
KOIN. Κοινον, Community
KOΛ. Κολωνιας, Colony, Colophon
KOM. Commodus
KOP. Corcyra
KP. Cragus in Lycia
KPA. Cranos
KPH. Crete
KTH. Ctemenæ, *Pell.*
KΥ. Cuma, Cydonium, Cyon
KΥΘ. Cythnus
KΥΠ. Cyprus
KΥP. Cyrene

Λ

Λ. or L. Λυκαβαντος, Year
Λ. Lucius
ΛA. Lacedæmon
ΛAM. Lamea, Lampsacus
ΛAP. Larissa
ΛAPI. Larinum
ΛE. ΛEΥ. Leucas
ΛEON. Leontium
ΛHM. Lemnos
ΛIΠ. Lipara
ΛIΥI. Liviopolis
ΛO. ΛΩK. Locri
ΛOΓ. Longone
ΛΥΓ. ΛΥK. Lyctus

M

M. Marcus, Malea, Megalopolis, Mazaka
MA. Maronea, Massilia, Macedonia
MAΓ. Magnesia
MAKPO. Macrocephali
MAM. Mamertini

ΜΑΣΣ. Massilia
ΜΑΖ. Mazara
ΜΕ. Menelais, on Syrian regal coins
ΜΕΝΕΚ. Menecrates
ΜΕ. ΜΕΓ. Megara, Megalopolis, Melite
ΜΕΓ. Μεγαλος, Great
ΜΕΣ. Messana
ΜΕΤΑ. Metapontum
Μ. ΜΗΤΡΟ. Metropolis
ΜΙ. Miletus
ΜΚ. Mazaka of Cappadocia, on coins of Mithridates VI.
ΜΟΡ. Morgantia
ΜΥ. Mycenæ
ΜΥΡ. Myrlea.
ΜΥΤΙ. Mytilene

N

Ν. Naupactos
ΝΑΞ Naxos
ΝΑΥΑΡΧ. Ναυαρχιδρο, enjoying a sea-port
ΝΕ. Nemea
Ν. ΝΕΩΚ. Neocori
ΝΕΟΠ. Neopolis
ΝΕΡ. Nerva
ΝΙΚ. Nicæum, Nicomedia
ΝΥΣ. Nysæi, or coins of Scythopolis, *Pell.*

O.

ΟΙ. Oethæi
ΟΝ. Οντος, being
ΟΠΕΛ. Opelius
ΟΠ. Opus
ΟΡΥ. Orycus
ΟΡΧ. Orchomenus
ΟΥΠ. or ΥΠ. Ουπατος or Υπατος, Consul
ΟΥΕΡ. Verus
ΟΥΗ. Vetus
ΟΥΕΣΠ. Vespasianus
ΟΥΙΤΕΛ. Vitellius
ΟΦΡΥ. Ophrynium

Π

Π. Παρα, Προς, upon
Π. ΠΟΠΛ. Publius
Π. ΠΑ. Paphos or Paros
ΠΑΙΣ. Pæstum
ΠΑΝ. Panarmus
ΠΑΡ. Paropinum
ΠΑΡΙ. Paros
ΠΑΡΘ. Parthicus
ΠΕ. Perinthus
ΠΛΑ. Pella
ΠΕΡ. Pergus
ΠΕΡΤ. Pertinex
ΠΕΣΚ. Pescennius
Π. ΠΗ. Pelusium
ΠΙΝ. Pinamytæ
ΠΛΑ. Plateæ
ΠΟ. Pontus
ΠΟΛΥ. Polyrrhenum
ΠΟΣ. Posidonia
ΠΡΑΣ. Prassus
Π. ΠΡΥ. Πρυτανος, Præfect
ΠΡ. ΠΡΕΣ. Πρεσβιος, Legate
ΠΡΟ. Proconnesus
ΠΡΟΔΙ. Προδικος, Curator
Π. ΠΡΩΤ. Πρωτος, First
ΠΤ. Ptolemais
ΠΥ. Pylos

P

ΡΟ. Rhodes

Σ

Σ. ΣΑ. Salamis, Samos, Syria
ΣΑ. Samosate
ΣΑΛΑΠ. Salapia
ΣΕΡ. Sardis
ΣΕ. Seriphus, Segeste
ΣΕΒ. Σεβαστος, Augustus
ΣΕΛ. Selinus, Seleucia
ΣΕΠΤ. Septimius
ΣΙ. Siphnos
ΣΙΔ. Side
ΣΙΝΩ. Sinope
ΣΜΥ. Smyrna
ΣΤΡ. ΣΤΡΑ. Στρατηγος, Prætor
ΣΥΒ. Sybaris
ΣΥ. ΣΥΡΑ. Syracuse
ΣΥΡ. Syria
ΣΩ. Solæ

T

Τ. Titus
ΤΑΒΑΛ. Tabala
ΤΑ. ΤΑΝΑ. Tanagra
ΤΑΡ. Tarentum, Tarsus
ΤΑΥΡ. Tauromenum
ΤΕ. Tementis
ΤΕΡ. Terina
ΤΗ. Tenus
ΤΙ. ΤΙΒ. Tiberius
ΤΡΑ. Trallis
ΤΡΙ. Tripolis
ΤΡΟ. Troizene
ΤΥΑΝ. Tyana
ΤΥ. Tyndaris
ΤΥΡ. Tyre (monogram)

Υ

ΥΕ. ΥΕΛ. Velia
ΥΠ. ΥΠΑΤ. Υπατος, Consul

Φ

Φ. Philip; Phœstus, Philuntium
ΦΑ. Phaselis
ΦΑΡ. Pharsalus
ΦΙ. Vibius, Philippopolis
ΦΙΝΕ. Phineium
ΦΛ. Flavius
ΟΚ. Phocæum
ΦΟΥΛ. Fulvia
ΦΥ. Phycus in Cyrene

X

Χ. Chios
ΧΑΛ. Chalcis
ΧΕΡ. Chersonesus
ΧΙ. Chytri in Crete.

*Greek Numerals.*

| | | | | | |
|---|---|---|---|---|---|
| Α. | 1. | Ι. | 10. | Ρ. | 100. |
| Β. | 2. | Κ. | 20. | Σ. or C | 200. |
| Γ. | 3. | Λ. | 30. | Τ. | 300. |
| Δ. | 4. | Μ. | 40. | Υ. | 400. |
| Ε. | 5. | Ν. | 50. | Φ. | 500. |
| ς. or ϛ | 6. | Ξ. | 60. | Χ. | 600. |
| Ζ. | 7. | Ο. | 70. | Ψ. | 700. |
| Η. | 8. | Π. | 80. | Ω. | 800. |
| Θ. | 9. | ϙ or ϙ | 90. | ϙ. | 900. |

*Examples.* I is 10: add A to I, and IA makes 11: so IB, 12; IΓ, 13, &c. K is 20, KA, 21, &c. PIA makes 111. The English word AIR marks the grand initial numerals. On coins the numerals are often placed in retrograde order; which makes no difference in the value, as every letter is appropriated to its number. Thus TΛΓ or ΓΛΤ imply the same, 333. But this advantage being unknown

to the Roman numerals and Arabic ciphers, is apt to puzzle the beginner.

*Roman Coins.*

A

A. AULUS: in the exergue it implies the first mint, as ANT. A. coined at Antioch in the first mint.
A. A. A. F. F. Auro, Argento, Ære, Flando, Feriundo
A. or AN. Annus
A. A. Apollo Augusti
A. F. A. N. Auli filius, Auli nepos
ABN. Abnepos
ACT. Actiacus, or Actium
AD. FRV. EMV. Ad fruges emundas
ADIAB. Adiabenicus
ADOP. Adoptatus
ADQ. Adquisita
ADV. Adventus
AED. Ædes
AED. P. Ædilitia protestate
AED. S. Ædes sacræ
AED. CVR. Ædilis Curulis
AED. PL. Ædilis Plebis
AEL. Ælius
AEM. or AIMIL. Æmilius
AET. Æternitas
AFR. Africa, or Africanus
ALBIN. Albinus
ALIM. ITAL. Alimenta Italiæ
ANN. AVG. Anno Augusti
A. N. F. F. Annum Novum Faustum Felicem
ANIC. Anicius
ANN. DCCCLXIIII. NAT. VRB. P. CIR. CON. Anno 864. Natali Urbis Populo Circenses constituti
ANT. AVG. Antonius Augur
ANT. Antonius, or Antoninus
AP. Appius
A. P. F. Argento Publico Feriundo
A. POP. FRVG. AC. A Populo Fruges Acceptæ
AQ. or AQL. Aquilius
AQVA MAR. Aqua Martia
ARAB. ADQ. Arabia Adquisita
ARR. Arrius
AVG. Augur, Augustus, Augusta
AVG. D. F. Augustus Divi Filius
AVGG. Two Augusti
AVGGG. Three Augusti
AVR. or AVREL. Aurelius

B

B. The mark of the second mint in any city
BON. EVENT. Bonus Eventus
B. R. P. NAT. Bono Reipublicæ Nato
BRIT. Britannicus
BRVT. Brutus.

C

C. Caius, Colonia
C. A. Cæsarea Augusta
C. CAE. or CAES. Cæsar
CAESS. Cæsares
CARTH. Carthage
CEN. Censor
CENS. P. Censor Perpetuus
CEST. Cestius, or Cestianus
CIR. CON. Circum Condidit, or Circenses Concessit
CIVIB. ET. SIGN. MILIT. A. PARTH. RECVP. Civibus et Signis Militaribus a Parthis Recuperatis
CN. Cneius
COEL. Cœlius
CON. OB. Constantinopoli Obsignata, or Constantinopoli Officina secunda, or Conflata Obryzo
COL. Colonia
CON. SVO. Conservatori suo
CONCORD. Concordia
CL. V. Clypeus Votivus
COMM. Commodus
CLOD. Clodius
CL. or CLAVD. Claudius
COS. Consul
COSS. Consules
CORN. Cornelius
CVR. X. F. Curavit Denarium Faciendum

D

D. Decimus, Divus, Designatus
DAC. Dacicus
D. F. Dacia felix
D. M. Diis Manibus
DES. or DESIG. Designatus
DICT. Dictator
DOMIT. Domitianus
D. N. Dominus noster
DID. Didius
D. P. Dii Penates
DV. Divius

E

EID. MAR. Idus Martiæ
EX. CONS. D. Ex Consensu Decurionum
EX. S. C. Ex Senatus Consulto
EQ. ORDIN. Equestris Ordinis
EX. A. PV. Ex Argento, or Auctoritate Publica
EXER. Exercitus
ETR. Etruscus

F

F. Filius, or Filia, or Felix, or Faciundum, or Fecit
FEL. Felix
FELIC. Felicitas
FL. Flavius
FLAM. Flamen
FORT. RED. Fortunæ Reduci
FOVRI. Fourius for Furius
FONT. Fonteius
FRVGIF. Frugiferæ (Cereri)
FVL. Fulvius
FVLG. Fulgerator

G

G. Gneius, Genius, Gaudium
GA. Gaditanus
G. D. Germanicus Dacicus
GEN. Genius
GERM. Germanicus
GL. E. R. Gloria Exercitus Roman
GL. P. R. Gloria Populi Romani
GOTH. Gothicus
G. P. R. Genio Populi Romani
G. T. A. Genius Tutelaris Ægypti, or Africæ

H

HEL. Helvius
HEL. Heliopolis
HER. Herennius, or Herennia
HO. Honos
HS. Sestertius

I

I. Imperator, Jovi, Julius
IAN. CLV. Janum clusit for clausit
IMP. Imperator
IMPP. Imperatores
I. S. M. R. Juno Sospita, Mater or Magna Regina
IT. Italia, Iterum

ITE. Iterum
IVL. Julius or Julia
IVST. Justus
I. I. S. Sestertius
I. O. M. SACR. Jovi Optimo, Maximo, Sacrum
II. VIR. Duumvir
III. VIR. R. P. C. Triumvir Reipublicæ Constituendæ
IIII. VIR. A. P. F. Quatuorvir, or Quatuorviri, Auro, or Argento, or Ære, Publico Feriundo
IVN. Junior

L

L. Lucius
LAT. Latinus
LEG. PROPR. Legatus Proprætoris
LEG. I. &c. Legio Prima, &c.
LEP. Lepidus
LENT. CVR. X. F. Lentulus Curavit Denarium Faciundum
LIBERO P. Libero Patri
LIB. PVB. Libertas Publica
LIC. Licinius
L. S. DEN. Lucius Sicinius Dentatus
LVC. Lucifera
LVD. CIR. Ludi Cercenses
LVD. EQ. Ludi Equestres
LVD. SAEC. F. Ludos. Sæculares Fecit

M

M. Marcus, or Marius
MAR. CL. Marcellus Clodius
M. I. Marci Filius
M. OTACIL. Marcia Otacilia
MAG. or MAGN. Magnus
MAC. Macellum
MAX. Maximus
MAR. Martia (aqua)
MAR. VLT. Marti Ultori
MES. Messius
METAL. Metallum
MINAT. Minatius
MINER. Minerva
M. M. I. V. Municipes Municipii Julii Uticensis
MON. or MONET. Moneta

N

N. Nepos or Noster
N. C. Nobilissimus Cæsar
NAT. VRB. Natalis Urbis
NEP. Nepos
NEP. RED. Neptuno Reduci

O

O. Optimo
OB. C. S. Ob Cives Servatos
OF. Officina
OPEL. Opelius
ORB. TERR. Orbis Terrarum

P

P. or POT. Potestate
PAC. ORB. TER. Pacatori Orbis Terrarum
PAPI. Papius or Papirius
PARTH. Parthicus
PERP. Perpetuus
PERT. or PERTIN. Pertinax
PESC. Pescennius
P. F. Pius Felix
PLAET. Plætonius
P. L. N. Plecunia Londini Notata
P. LON. S. Pecunia Londini Signata
P. M. or PONT. MAX. Pontifex Maximus
POMP. Pompeius
P. P. Pater Patriæ
PR. Prætor
P. R. Populus Romanus
PRAEF. CLAS. ET OR. MARIT. Præfectur Classis et Oræ Maritimæ
PRINC IVVENT. Princeps Juventutis
PRIV. Privernum
PROC. Proconsul
PRON. Pronepos
PROP. Proprætor
PROQ. Proquæstor
PROV. DEOR. Providentia Deorum
PVPIEN. Pupienus

Q

Q. Quintus, or Quæstor
Q. C. M. P. I. Quintus Cæcilius Metellus-Pius Imperator
Q. DESIG. Quæstor Designatus
Q. P. Quæstor Prætorius
Q. PR. Quæstor Provincialis

R

R. Roma, Restituit
RECEP. Receptis, or Receptus
REST. Restituit
ROM. ET. AVG. Romæ et Augusto
R. P. Respublica

S

SAEC. AVR. Sæculum Aureum
SAEC. FEL. Sæculi Felicitas
SAL. Salus
SALL. Sallustia
SARM. Sarmaticus
S. C. Senatus Consulto
SCIP. ASIA. Scipio Asiaticus
SEC. ORB. Securitas Orbis
SEC. PERP. Securitas Perpetua
SEC. TEMP. Securitas Temporum
SEN. Senior
SEPT. Septimius
SER. Servius
SEV. Severus
SEX. Sextus
SIC. V. SIC. X. Sicut Quinquennalia, sic Decennalia
SIG. Signis
S. M. Signata Moneta
S. P. Q. R. Senatus Populusque Romanus
STABIL. Stabilita (terra)
SVL. Sulla

T

T. Titus, Tribunus
TER. Terentius, or Tertium
TEMP. Temporum
TI. Tiberius
TR. or TREV. Treveris
TREB. Trebonianus
TR. MIL. Tribunis Militaris
TR. P. or TRIB. POT. Tribunicia Potestate.

V

V. Quintum
V. C. Vir Clarissimus
VESP. Vespacianus
VIB. Vibius
VICT. Victoria
VII. VIR. EPVL. Septemvir Epulonum
VIL. PVB. Villa Publica
VIRT. Virtus
VN. MR. Venerandæ Memoriæ
VOT. X. MVLT. XX. Votis Decennalibus Multiplicatis Vicennalibus

X

X. Decem, Denarius
XV. VIR. SACR. FAC. Quindecium Vir Sacris Faciundis.

*Abbreviations on the Exergue; from Banduri and Monaldini.* Pinkerton.

A. Officina Prima
ALE. Alexandria
AMB. Antiochensis Moneta Secundæ Officinæ
AN. ANT. ANTI. Antiochia
ANB. Antiochiæ Secunda Officina: to ANH. Antiochiæ Octava Officina
A. P. L. (In officina) Prima percussa Lugduni
AQ. AQL. Aquileiæ
AQ. O. B. F. Aquileiæ Officinæ Secundæ Fabrica
AQ. P. S. Aquileiæ Pecunia Signata
AQ. S. Aquileiæ Signata
A. AR. ARL. Arelate
A. SISC. Prima (in officina) Sisciæ
B. SIRM. Secunda Sirmii
B. S. L. C. Secunda Signata Lugduni
C. Θ. Constantinopoli Nona
COMOB. Conflata Moneta Obryzo. Only on gold or silver from a gold dye
CON. Constantinopoli
CONOB. Conflata Obryzo. Only on gold
CONS. Constantinopoli
KART. Carthago
K. O. Carthaginensis Officina
L. LC. LVC. LVG. Lucduni, Lugduni
L. LON. Londini
L. P. Lugdunensis vel Londinensis Pecunia
LVC. P. S. Lugduni Pecunia Signata
MDPS. Mediolani Pecunia Signata
M. K. V. T. Moneta Kartaginensis Urbis (in officina) Tertia
M. L. Moneta Lugdunensis vel Londinensis
MOSTT. Moneta Officinæ Secundæ Treverorum
MSTR. Moneta Signata Treveris
O. Officina
OFF. III. CONST. Officina Tertia Constantinopoli
PARL. Percussa or Pecunia Arelate
PLON. Pecunia Londinensis
PLVG. Pecunia Lugdunensis
P. R. Pecunia Romana, or Percussa Romæ
P. T. Pecunia Treverensis
Q. AR. Quincta Arelatensis (officina)
R. RO. ROM. Romæ
RA. Ravennæ
ROPS. Romæ Pecunia Signata
S. AR. Signata Arelate
S. CONST. Signata Constantinopoli
SIS. Sisciæ
SS. P. Sisciensis Pecunia
SISC. V. Siscia Urbs
SMA. Signata Moneta Antiochiæ
S. M. HER. Signata Moneta Heracleæ
S. M. N. Signata Moneta Nicomediæ
S. M. R. Signata Moneta Romæ
S. T. Signata Treveris
TESOB. Tessalonicæ Officina Secunda
THEOP. Theopoli
TR. Treveris Officina Secunda

*Explanation of Plates 104 and 105.*

Fig.
1. A Persian Daric
2. A drachm of Egina
3. A silver hemidrachm of Alexander the Great
4. Tigranes the younger of Armenia, with his sister
5. One of the coins of the Arsacidæ of Parthia
6. A coin of the Sassanidæ of Persia. First published by Mr. Pinkerton
7. Denarius of Cneius Pompey from Mr. Pinkerton, reverse. Received by Spain
8. A silver coin of Carosius
9. A brass coin of Cunobelinus
10. Pescennius Niger. Struck at Antioch; unique. In Dr. Hunter's cabinet; published by Mr. Pinkerton
11. Reverse of Claudius in first brass
12. Twenty ancient pennies (probably Scotch)
13. A Saxon penny
14. A reverse of Maximian I. in third brass. The same reverse occurs of Diocletian, Severus Cæsar, and Constantine I.
15. A Saxon styca
16. Reverse of Adrian
17. Of Antoninus Pius
18. Of Commodus
19. Of Severus
20. The ryal of queen Mary of Scotland
21. A penny of William of Scotland
22. A penny of Robert the Great
23. An Irish penny
24. The gold penny of Henry III.
25. The large noble of the first coinage of Edward III.
26. A reverse of Commodus in first brass, from Dr. Hunter's cabinet. The Apollo Monetæ was the deity of art and elegant design in coinage

MEDA'LLIC. *a.* Pertaining to medals.

MEDALLION, or MEDALION, a medal of an extraordinary size, supposed to be anciently struck by the emperors for their friends, and for foreign princes and ambassadors. But, that the smallness of their number might not endanger the loss of the devices they bore, the Romans generally took care to stamp the subject of them upon their ordinary coins. Medallions, in respect of the other coins, were the same as modern medals in respect of modern money: they were exempted from all commerce, and had no other value than what was set upon them by the fancy of the owner. Medallions are so scarce, that there cannot be any set made of them, even though the metals and sizes should be mixed promiscuously.

ME'DALIST. *s.* (*medailliste*, French.) A man skilled or curious in medals (*Add.*).

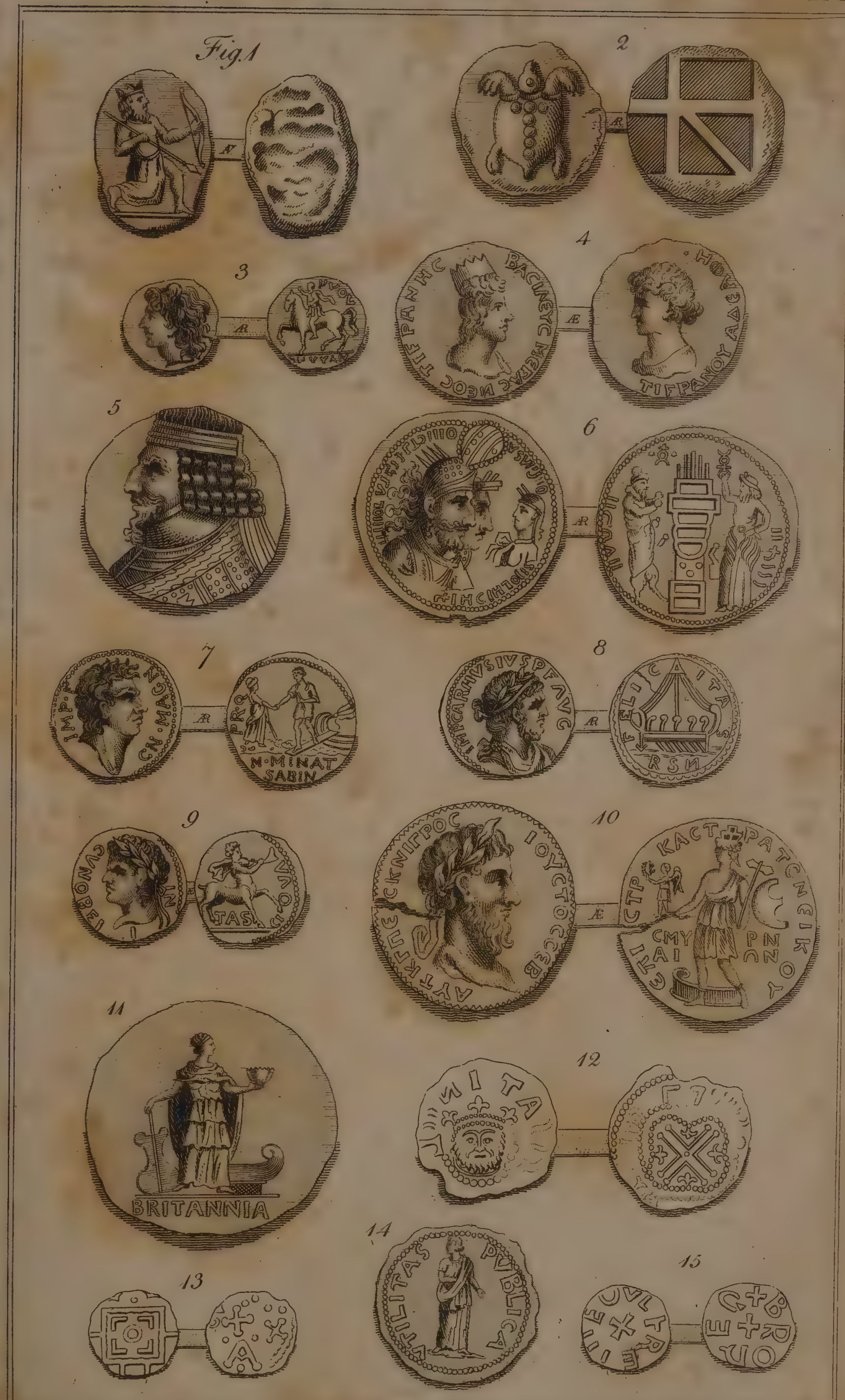
*To* ME'DDLE. *v. n.* (*middelen*, Dutch.) 1. To have to do (*Bacon*). 2. To interpose; to act in any thing (*Dryden*). 3. To interpose or intervene importunely or officiously (*Proverbs*).

*To* ME'DDLE. *v. a.* (from *mesler*, French). To mix; to mingle: obsolete (*Spenser*).

ME'DDLER. *s.* (from *meddle*.) One who busies himself with things in which he has no concern (*Bacon*).

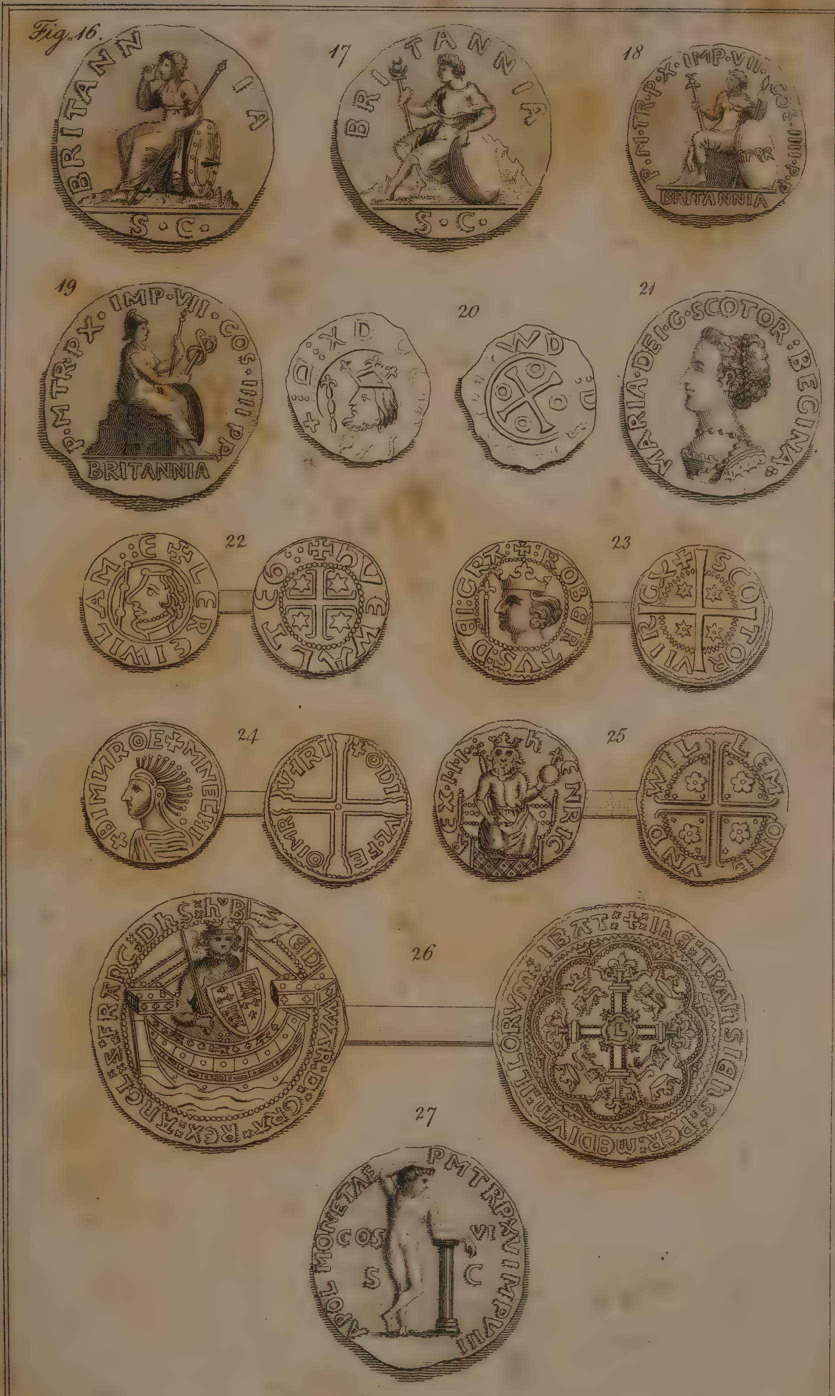
ME'DDLESOME. *a.* Intermeddling (*Ainsworth*).

MEDE (Joseph), a learned divine, was born in 1586, at Berden in Essex, and in 1602 went to Christ's College, Cambridge, where he studied with intense application, and, on taking his degree of M. A. was chosen fellow. He refused several preferments, particularly the provostship of Trinity College,




Mutlow. Sc. Russell Cot.

Published by G. Kearsley, Fleet Street, Decr. 1st. 1810.

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Cambridge, which was repeatedly offered him by archbishop Usher. He died in 1638. All his works have been collected into one volume folio. His Comments on the Apocalypse are by far the best of his writings, and his system in explaining that mysterious book has been followed by some of our greatest modern divines.

MEDEA, in fabulous history, a celebrated sorceress, daughter of Æetes, king of Colchis. She was the niece of Circe. When Jason came to Colchis in quest of the golden fleece, Medea became enamoured of him, and it was to her labours that the Argonauts owed their preservation. (See JASON and ARGONAUTÆ.) Medea had an interview with her lover in the temple of Hecate, where they bound themselves by the most solemn oaths, and promised eternal fidelity. No sooner had Jason overcome all the difficulties which Æetes had placed in his way than Medea embarked with the conquerors for Greece. To stop the pursuit of her father, she tore to pieces her brother Absyrtus, and left his mangled limbs in the way through which Æetes was to pass. When Jason reached Iolchos, the return of the Argonauts was universally celebrated; but Æson, the father of Jason, was unable to assist at the solemnity, on account of the infirmities of his age. Medea, at her husband's request, removed the weakness of Æson, and by the juice of certain herbs restored him to the vigour of youth. Her conduct, however, to the daughter of Pelias, and her refusal to bring Pelias to life after they boiled his flesh in a cauldron, greatly irritated the people of Iolchos, and Medea, with her husband, fled to Corinth, to avoid the resentment of an offended populace. Here they lived for ten years, but the love of Jason for Glauce, the king's daughter, soon interrupted their mutual harmony, and Medea was divorced. Medea revenged the infidelity of Jason by causing the death of Glauce, and the destruction of her family. (See GLAUCE). This action was followed by another more atrocious. Medea killed two of her children in their father's presence, and, when he attempted to punish the barbarity, she fled through the air upon a chariot drawn by winged dragons. From Corinth Medea came to Athens, where she married king Ægeus. From her connection with Ægeus, Medea had a son, who was called Medus. Soon after, when Theseus wished to make himself known to his father (see ÆGEUS), Medea, jealous of his fame, and fearful of his power, attempted to poison him at a feast which had been prepared for his entertainment. Her attempts, however, failed of success, and the sight of the sword which Theseus wore by his side convinced Ægeus that the stranger against whose life he had so basely conspired was no less than his own son. The father and the son were reconciled, and Medea, to avoid the punishment which her wickedness deserved, fled, at length, from Athens, and came to Colchis, where, according to some, she was reconciled to Jason, who had sought her in her native country, after her sudden departure from Corinth.

MEDE'OLA. Climbing African asparagus. In botany, a genus of the class hexandria, order trigynia. Calyxless; coral six-parted, revolute; berry superior, three-seeded. Three species: Virginia: Æthiopia: the Cape.

MEDIA, a celebrated country of Asia, bounded on the north by the Caspian sea, west by Armenia, south by Persia, and east by Parthia and Hyrcania. It was originally called Aria till the age of Medus, the son of Medea, who gave it the name of Media. The Medes were warlike in the primitive ages of their power, and were remarkable for the homage they paid to their kings, who were sytled king of kings. This title was afterwards adopted by their conquerors, the Persians, and it was still in use in the age of the Roman emperors.

MEDIA, in botany. See DODECATHEON.

MEDIANA, the name of a vein or little vessel, made by the union of the cephalic and basilic, in the bend of the elbow.

MEDIANT, in music, the appellation given to the third above the key-note, because it divides the interval between the tonic and the dominant into two thirds. When the lower of these thirds is minor and the upper major, the key is minor; and when the lower third is major and the upper minor, the key is major.

MEDIASTINUM, in anatomy, a double membrane, formed by a duplicature of the pleura; serving to divide the thorax and the lungs into two parts, and to sustain the viscera, and prevent their falling from one side of the thorax to the other. See ANATOMY.

*To* ME'DIATE. *v. n.* (from *medius*, Latin). 1. To interpose as an equal friend to both parties; to intercede (*Rogers*). 2. To be between two (*Digby*).

*To* ME'DIATE. *v. a.* 1. To effect by mediation (*Clarendon*). 2. To limit by something in the middle (*Holder*).

ME'DIATE. *a.* (*mediat*, French). 1. Interposed; intervening (*Prior*). 2. Middle; between two extremes (*Prior*). 3. Acting as a mean: unusual (*Wotton*).

ME'DIATELY. *ad.* (from *mediate*.) By a secondary cause (*Raleigh*).

MEDIA'TION. *s.* (*mediation*, French). 1. Interposition; intervention; agency between two parties, practised by a common friend (*Bacon*). 2. Agency interposed; intervenient power (*South*). 3. Intercession; entreaty for another.

MEDIATOR, a person that manages or transacts between two parties at variance in order to reconcile them. The word, in Scripture, is applied, 1. To Jesus Christ, who is the only intercessor and peace-maker between God and man; 1. Tim. ii. 5. 2. To Moses, who interposed between the Lord and his people, to declare unto them his word; Deut. v. 5. iii. 19.

MEDIATORIAL. ME'DIATORY. *a.* (from *mediator*.) Belonging to a mediator.

MEDIA'TORSHIP. *s.* (from *mediator.*) The office of a mediator.

MEDIA'TRIX. *s.* A female mediator (*Ains.*)

MEDICA'GO, in botany, a genus of the class diadelphia, decandria. Legume compressed, spiral, forcing back the heel of the corol from the banner. Thirty-seven species, almost all natives of the south of Europe; four common to the pastures and sandy soils of our own country. They are thus subdivided:

A. Legumes crescent-shaped, more or less twisted; comprising nine species, all denominated moon-trefoil.

B. Legumes spirally twisted, comprising the rest, and denominated medich.

Of all these the only species particularly worthy of notice is M. sativa, lucerne. It pertains to the former division, and is specifically characterised by having its peduncles racemed; legumes smooth, spirally twisted; stipules very entire; leaflets oblong, toothed. As a green fodder it has of late years been very generally recommended and very successfully cultivated by our graziers.

ME'DICAL. *a.* (*medicus*, Lat.) Physical; relating to the art of healing (*Brown*).

ME'DICALLY. *ad.* (from *medical.*) Physically; medicinally (*Brown*).

ME'DICAMENT. *s.* (*medicamentum*, Lat.) Any thing used in healing; generally topical applications (*Hammond*).

MEDICAME'NTAL. *a.* (from *medicament.*) Relating to medicine, internal or topical.

MEDICAME'NTALLY. *ad.* After the manner of medicine (*Brown*).

*To* ME'DICATE. *v. a.* (*medico*, Lat.) To tincture or impregnate with any thing medicinal (*Arbuthnot*).

MEDICA'TION. *s.* (from *medicate.*) 1. The act of tincturing or impregnating with medicinal ingredients (*Bacon*). 2. The use of physic (*Brown*).

MEDI'CINABLE. *a.* (*medicinalis*, Latin.) Having the power of physic (*Bacon*).

MEDICI'NAL. *a.* (*medicinalis*, Latin.) 1. Having the power of healing; having physical virtue (*Milton*). 2. Belonging to physic (*Butler*).

MEDI'CINALLY. *ad.* Physically (*Dryden*).

MEDICINE. (*medicina*, Lat. of uncertain derivation; perhaps from μηδος, μηδομαι, *cura, consilium; curam gerere, consulere;* though this root was seldom or never, among the Greeks, applied to the study or cure of diseases, but generally θεραπευω or ιατρευω, the latter of which has never been anglicised, but from the former of which we obtain the word *therapeutics*). The art or science of healing. In this extensive and general sense it includes the materia medica, or substances employed in medicine; pharmacy, or the mode of compounding them; and praxis, or the phænomena of diseases and practice of medicine. In a more limited, and perhaps a more correct sense, however, the term is confined to the last division; and in this sense alone we shall understand it in the present instance, referring the reader to the article Materia Medica for the substances employed in the art of healing, and to the article Pharmacy for the mode of compounding them, and their respective results in a state of combination. Thus limited, we shall consider the subject of medicine under the following heads: its History; its Theory; its Scope (usually called Nosology); and its Practice: and in so doing the present writer considerably avails himself of an article upon the same subject, which, by particular request, he drew up two or three years ago for another highly respectable work of a similar kind; to which, however, he will make two or three important additions, so as to render it as complete as the narrow scope to which we are necessarily confined will allow us.

### Part I.

*History of Medicine.*

The commencement of the medical profession, whether regarded as an art or a science, or both, is lost in the darkness of the earliest ages. The fabulous history of the ancients derives it immediately from their gods; and even among the moderns, some writers of established reputation are of opinion that it may justly be considered as of divine origin: but without adopting any supposition, of which no probable evidence can be given, we may conclude, that mankind were naturally led to it from casual observations on the diseases to which they found themselves subjected; and that therefore, in one sense at least, it is as ancient as the human race; but at what period it began to be practised as an art, by particular individuals following it as a profession, is not known. The most ancient physicians we read of were those who embalmed the patriarch Jacob by order of his son Joseph. The sacred writer styles these physicians servants to Joseph, whence we may be assured that they were not priests, as the first physicians are generally supposed to have been; for in that age we know the Egyptian priests were in such high favour, that they retained their liberty, when, through a public calamity, all the rest of the people were made slaves to the prince. It is not probable, therefore, that, among the Egyptians, religion and medicine were originally conjoined; and if we suppose the Jews not to have invented the art, but received it from some other nation, it is as little probable that the priests of that nation were their physicians as those of Egypt. That the Jewish physicians were absolutely distinct from their priests, is very certain. Yet as the Jews resided for such a long time in Egypt, it is probable they would retain many of the Egyptian customs, from which it would be very difficult to free them. We read, however, that when king Asa was diseased in his feet, he sought not to the Lord, but to the physicians. Hence we may conclude, that among the Jews the medicinal art was looked upon as a mere human invention; and it was thought that the Deity never cured diseases by making people acquainted with the virtues of this or that herb, but only by his miraculous power. That the same opinion prevailed among the heathens, who were neighbours to the Jews, is also probable from what we read of Ahaziah king of Judah, who having sent messengers to enquire of Baalzebub, god of Ekron, concerning his disease, he did not desire any remedy from him or his priests, but simply to know whether he should recover or not. What seems most probable on this subject therefore is, that religion and medicine came to

be mixed together only in consequence of that degeneracy into ignorance and superstition which took place among all nations. The Egyptians, we know, came at last to be sunk in the most ridiculous and absurd superstition; and then, indeed, it is not wonderful to find their priests commencing physicians, and mingling charms, incantations, &c. with their remedies. That this was the case, though long after the days of Joseph, we are very certain; and indeed it seems as natural for ignorance and barbarism to combine religion with physic, as it is for a civilized and enlightened people to keep them separate. Hence we see, that among all modern barbarians, their priests or conjurors are their only physicians.

We are so little acquainted with the state of physic among the Egyptians, that it is needless to say much concerning them. They attributed the invention of medicine, as they did also that of many other arts, to Thoth, the Hermes or Mercury of the Greeks. He is said to have written many things in hieroglyphic characters upon certain pillars, in order to perpetuate his knowledge, and render it useful to others. These were transcribed by Agathodemon, or the second Mercury, the father of Tat, who is said to have composed books of them, that were kept in the most sacred places of the Egyptian temples. The existence of such a person, however, is very dubious; and many of the books ascribed to him were accounted forgeries as long ago as the days of Galen. There is also great reason to suspect, that those books were written many ages after Hermes, and when physic had made considerable advances. Many of the books attributed to him are trifling and ridiculous; and though sometimes he is allowed to have all the honour of inventing the art, he is, on other occasions, obliged to share it with Osiris, Isis, and Apis, or Serapis. After all, the Egyptian physic appears to have been little else than a collection of absurd superstitions. Origen informs us, that they believed there were thirty-six demons or gods of the air, who divided the human body among them; that they had names for all of them; and that by invoking them according to the part affected, the patient was cured. Of natural medicine we hear of none recommended by the father of Egyptian physic, except the herb moly, which he gave to Ulysses, in order to secure him from the enchantments of Circe; and the herb mercury, of which he first discovered the use. His successors made use of venesection, cathartics, emetics, and clysters. There is no proof, however, that this practice was established by Hermes: on the contrary, the Egyptians themselves pretended, that the first hint of those remedies was taken from some observations on brute animals. Venesection was taught them by the hippopotamus, which is said to perform this operation upon itself. On these occasions, he comes out of the river, and strikes his leg against a sharp-pointed reed. As he takes care to direct the stroke against a vein, the consequence must be a considerable effusion of blood; and this being suffered to run as long as the creature thinks proper, he at last stops up the orifice with mud. The hint of clysters was taken from the ibis, a bird which is said to give itself clysters with its bill, &c. They used venesection, however, but very little, probably on account of the warmth of the climate; and the exhibition of the remedies above mentioned, joined with abstinence, formed most of their practice. The Greeks too had several persons to whom they attributed the invention of physic, particularly Prometheus, Apollo or Pæan, and Æsculapius; which last was the most celebrated of any. But here we must observe, that as the Greeks were a very warlike people, their physic seems to be little else than what is now called surgery, or the cure of wounds, fractures, &c. Hence Æsculapius, and his pupils Chiron, Machaon, and Podalirius, are celebrated by Homer only for their skill in curing these, without any mention of their attempting the cures of internal diseases. We are not, however, to suppose that they confined themselves entirely to surgery. They no doubt would occasionally prescribe for internal disorders; but as they were most frequently conversant with wounds, we may naturally suppose the greatest part of their skill to have consisted in knowing how to cure these. If we may believe the poets indeed, the knowledge of medicine seems to have been very generally diffused. Almost all the heroes of antiquity are reported to have been physicians as well as warriors. Most of them were taught physic by the centaur Chiron. From him Hercules received instructions in the medicinal art, in which he is said to have been no less expert than in feats of arms. Several plants were called by his name; from whence some think it probable that he found out their virtues, though others are of opinion that they bore the name of this renowned hero on account of their great efficacy in removing diseases. Aristæus king of Arcadia was also one of Chiron's scholars, and supposed to have discovered the use of the drug called silphium, by some thought to be asafœtida. Theseus, Telamon, Jason, Peleus, and his son Achilles, were all renowned for their knowledge in the art of physic; the last is said to have discovered the use of verdigris in cleansing foul ulcers. All of them, however, seem to have been inferior in knowledge to Palamedes, who hindered the plague from coming into the Grecian camp after it had ravaged most of the cities of Hellespont, and even Troy itself. His method was to confine his soldiers to a spare diet, and oblige them to use much exercise. The practice of these ancient Greek physicians, notwithstanding the praises bestowed upon them by their poets, seems to have been very limited, and in some cases even pernicious. All the external remedies applied to Homer's wounded heroes were fomentations; while, inwardly, their physicians gave them wine, sometimes mingled with cheese scraped down. A great deal of their physic also consisted in charms, incantations, amulets, &c. of which, as they are common to all superstitious and ignorant nations, it is superfluous to take any farther notice. In this way the art of medicine continued among the Greeks for many ages. As its first professors knew nothing of the animal economy, and as little of the theory of diseases, it is plain, that whatever they did must have been in consequence of mere random trials, or empiricism, in the most strict and proper sense of the word. Indeed, it is evidently impossible that this, or almost any other art, could originate from any other source than trials of this kind. Accordingly, we find that some ancient nations were accustomed to expose their sick in temples, and by the sides of highways, that they might receive the advice of every one who passed. Among the Greeks, however, Æsculapius was reckoned the most eminent practitioner of his time, and

his name continued to be revered after his death. He was ranked amongst the gods; and the principal knowledge of the medicinal art remained with his family to the time of Hippocrates, who reckoned himself the seventeenth in a lineal descent from Æsculapius, and who was truly the first who treated of medicine in a regular and rational manner.

Hippocrates, who is supposed to have lived four hundred years before the birth of Christ, is the most ancient author whose writings have descended to the present day: and he is hence justly regarded as the father of medicine. In this period, and indeed till a century or two ago, the distinct branches of medicine and surgery were studied and practised by the same person: Hippocrates, therefore, has been universally regarded as having contributed equally to our physiological and anatomical knowledge of the human frame, and the few anecdotes relating to him for which we can find room have been already communicated to the reader under the article Anatomy. We shall here therefore only add those opinions of the Coan sage which more immediately apply to the science of general therapeutics, and which are most entitled to general attention.

As far as Hippocrates attempts to explain the causes of disease, he refers much to the humours of the body, particularly to the blood and the bile. He treats also of the effects of sleep, watchings, exercise, and rest; and all the benefit or mischief we may receive from them. Of all the causes of diseases, however, mentioned by Hippocrates, the most general are diet and air. On the subject of diet he has composed several books, and in the choice of this he was exactly careful; and the more so, as his practice turned almost wholly upon it. He also considered the air very much; he examined what winds blew ordinarily or extraordinarily; he considered the irregularity of the seasons, the rising and setting of the stars, or the time of certain constellations; also the time of the solstices, and of the equinoxes: those days, in his opinion, producing great alterations in certain distempers. He does not, however, pretend to explain how, from these causes, that variety of diseases arises which is daily to be observed. All that can be gathered from him with regard to this is, that the different causes above mentioned, when applied to the different parts of the body, produce a great variety of disorders: some of these he accounted mortal, others dangerous, and the rest easily curable, according to the cause from whence they spring, and the parts on which they fall. In several places also he distinguishes diseases, from the time of their duration, into acute, or short, and chronical, or long; he likewise distinguishes diseases by the particular places where they prevail, whether ordinary or extraordinary: the first, that is, those that are frequent and familiar to certain places, he called endemic diseases; and the latter, which ravaged extraordinarily sometimes in one place, sometimes in another, which seized great numbers at certain times, he called epidemic, that is, popular diseases; and of this kind the most terrible is the plague: he likewise mentions a third kind, the opposite of the former; and these he calls sporadic, or straggling diseases: these last include all the different sorts of distempers which invade any one season, which are sometimes of one sort, and sometimes of another. He distinguished between those diseases which are hereditary, or born with us, and those which are contracted afterwards; and likewise between those of a kindly, and such as are of a malignant nature, the former of which are easily and frequently cured, but the latter give the physicians a great deal of trouble, and are seldom overcome by all their care.

A foundation for the theory and practice of medicine being thus laid, the science was pursued with great avidity by Praxagoras, who nevertheless ventured, in some respect, to oppose the practice of Hippocrates, and by Erasistratus and Herophilus, of whom the last, as a disciple of Praxagoras, inclined rather to the Praxagorean than the Hippocratic school. Erasistratus, however, acquired a higher fame, though a more steady adherent to the older and Hippocratic doctrines, and to him we are indebted for the first regular indications of the pulse. About this period the profession of medicine began to be divided into the three branches of dietetic, pharmaceutic, and chirurgic; or those who pretended to cure by regimen alone, disregarding and even despising pharmacy; those who undertook to cure chiefly by pharmaceutic preparations, (of which number was Erasistratus himself); and those who devoted their whole time and attention to the chirurgical department of the medical art.

The next division of medical practitioners was into that of dogmatists and empyrics, the latter having commenced with Serapion, of Alexandria, about the year 287 before Christ, who, according to Galen, retained the mode of practice of Hippocrates, but pretended to despise his mode of reasoning. In reality, the sect to which Serapion belonged, and of which if not the founder, he was a very zealous supporter in its earliest infancy, depended upon their own personal experience alone, whether progressive or fortuitous. On the contrary, the dogmatists affirmed, that there is a necessity for knowing the latent as well as the evident causes of diseases, and that physicians ought to understand the natural actions and functions of the human body, and consequently its internal organs.

The physicians of chief fame who flourished subsequently to this division were Asclepiades, who opposed the Hippocratic theory of natural power and sympathy or attraction, by engrafting upon medicine the physical principles of the Epicurean philosophy; Themison, the founder of the methodic sect, whose doctrines evinced equal hostility to the dogmatists and empyrics, and divided diseases into the two classes of hypertonic and atonic, a division, which, in various modifications, has descended to the present day; Thessalus, contemporary with Nero, a man of some merit, but of inordinate vanity; and Celsus, deservedly denominated the Latin Hippocrates, whose work is equally valuable for the purity of its language, and the knowledge it communicates of the state of medicine at the time he wrote.

About the year after Christ 131, in the reign of Adrian, appeared the celebrated Galen, whose name makes so conspicuous an appearance in the history of physic. Practitioners were at this time divided into the three sections of methodists, dogmatists, and empyrics; Galen inclined to the second party, but with a true ecclectic spirit undertook to combine with its doctrine whatever existed of real worth in the two adverse systems, and hence to reform and give a finish to the science of medicine, beyond what it had ever possessed before. For the most part, he was a fol-

lower of Hippocrates, whose name he revered and whose opinions he commented upon, asserting in the course of his comments, that he had never been thoroughly understood before. Like Hippocrates, he denominated the vital principle *nature;* like him, he admitted the existence of four distinct humours, from the predominancy or deficiency or disproportion of which originate the different temperaments of the animal frame, and the varieties in the different diseases to which it is subject: these humours are the blood, phlegm, yellow and black bile. He likewise established three distinct kinds of auras, gasses or spirits, a natural, a vital, and an animal, which he regarded as so many instruments to distinct faculties; referring the seat and action of the first chiefly to the liver, of the second to the heart, of the third to the brain. His authority, in spite of all the fancies which are interwoven into his system, continued to prevail till the overthrow of the Roman empire, and learning and the arts were transferred to the eastern empire, under the auspices of which, however, the science of medicine does not appear to have made any progress; the Saracenic physicians totally neglecting the study of anatomy, and every other auxiliary pursuit, and merely adding to the materia medica a variety of plants, whose names we now seldom hear of, and whose pharmaceutic virtues have long been despised and forgotten.

From the period at which we are now arrived till the commencement of the sixteenth century the history of medicine furnishes no particulars of interest. It was this epoch that gave birth to Paracelsus, who having plunged deeply into the science of alchemy, if such a term as science be not prostituted by an application to such a subject, proscribing by one broad sweep all the reasonings of the ancient authors, endeavoured to explain all the facts and doctrines of medicine upon the principles of the fashionable pursuit of the day.

It was in 1628 that medicine acquired a knowledge of the momentous fact of the circulation of the blood, through the indefatigable labours of Dr. W. Harvey, who nevertheless had to struggle for years against a double torrent of nearly equal violence, before the jealousies and prejudices of the profession were completely mastered: some denying the fact altogether, and others contending that it was a point that had been ascertained for ages, and consequently that he was by no means entitled to the honour of the discovery. The establishment of this important fact, however, did not even for a long period after its general admission, produce all the advantages which might have been expected from it. For the physiologists of the day, in reasoning upon the powers by which this phœnomenon, as well as various others of the animal frame, was accomplished, unfortunately took hold of the mechanical philosophy as their guide: and every function was immediately attempted to be explained by the laws of projectiles, till the system at length destroyed itself, by the absurdity of the extent to which it was pushed.

Boerhaave, at this period, led the way to an admirable reformation, both of principle and practice; and by uniting the doctrines of Hippocrates with the philosophy of the times, framed a theory of medicine, upon the supposition of acrimony, lentor, and other changes in the circulating fluids. Contemporary with Boerhaave were Hoffman and Stahl; both of whom deviating from the theory of Boerhaave, the first laid the foundation of the spasmodic hypothesis, by resolving the origin of all diseases into an universal atomy, or an universal spasm in the primary moving powers of the system: and the second into the action of certain noxious agents, controuled, however, by the internal existence of a rational soul, that directs the entire economy. The humoral pathology nevertheless continued to prevail, till under the auspices of Dr. Cullen, the theories of Hoffman and Stahl were united into one common and ingenious system: a system which still holds its ground, though it has been since controverted by the sensorial hypothesis of Dr. Brown and Dr. Darwin. See BRUNONIAN and DARWINIAN SYSTEMS.

## PART II.

### *Theory of Medicine.*

Health is a system of harmony; and several of the older theories were founded upon this idea alone. A morbid affection in one organ, or set of vessels, is almost sure to produce a morbid affection in another; and a morbid secretion of one kind is generally succeeded by a morbid secretion of a second, a third, and even a fourth. The head cannot suffer without affecting the stomach; nor the stomach without affecting the skin; nor the skin without affecting the kidneys. The bloodvessels influence the nerves, the nerves the secernents, or *vice versâ*. The study of medicine therefore necessarily implies, as its first or preliminary pursuit, a general study of the animal frame, in its fluids and solids, its structure, its functions, and its habits; and in this preliminary pursuit consists that part of medicine which is usually denominated its theory.

### *Animal Fluids and Solids.*

*Fluids.*—These may be divided into, 1. The blood. 2. Those formed during digestion, before the food is converted into blood. 3. The secreted fluids.

*The blood.*—This consists of serum, coagulable lymph, red part, superfluous water, and extraneous substances introduced.

The serum, coagulable lymph, and superfluous water, are diffused through one another, and the red part is mechanically mixed with them. Some of the extraneous substances are also mechanically mixed with them, and some diffused through them.

The serum is fluid in any degree of heat between 30 and 160 of Fahrenheit's thermometer. In a less heat it freezes, in a greater it coagulates. It consists chemically of a coagulable matter, and water in which common sal ammoniac, and phosphoric ammoniac, and generally common salt, and frequently salenites, and fixed ammoniac, are dissolved; but it is a question whether the water chemically combined in the serum be also united with those neutral salts, or whether the serum, and the solution of these, are only diffused through one another. It is probably in itself colourless and inodorous; but it receives a yellowish or brownish hue from the putrescent mucilage of the blood, and acquires a smell from the essential oil. If it contained no neutral salts, it would be insipid, and incapable of stimulating. The superfluous water may be separated from it by filtration in the body, but that which is chemically combined with the other parts cannot. All the water may be evaporated from it by a less heat than 140 degrees of Fahrenheit's

thermometer, if it be exposed to the air. The other parts remain after this operation solid, and soluble again in water by commixture alone. The separation or addition of superfluous water does not affect its viscidity, so far as that is of any consequence in the circulation; but the separation of that water which is in chemical combination may render it more viscid. The water in chemical combination is never separated while the serum is contained in the blood-vessels; and of consequence this part of the blood is always equally viscid, so far as its viscidity can affect the circulation or secretions. It may be coagulated by acids, oils, alcohol, &c. but no substance can get into the blood-vessels in a sufficient degree of concentration to coagulate it. excepting by injection. It may be coagulated by a juice, secreted in the stomach. It has seldom, if ever, been found coagulated in the body. The only perceptible difference which has appeared in the coagulable part of the serum, from any observation hitherto made public, is, that sometimes, in coagulating, its parts adhere more or less firmly. The coagulable lymph is a compound of water and a coagulable mucilage. As long as it continues in the course of circulation, it is fluid in any degree of heat between 30 and 120 degrees of Fahrenheit's thermometer. When it is taken out of the blood-vessels it coagulates; whether it be in motion or at rest, exposed to the air or not, or in the heat of the human body, or in any other degree of heat. It has hardly ever been found coagulated in the blood-vessels of a living animal, unless they have been enlarged into aneurisms or varices. It is, however, generally found coagulated in the large vessels of the human body on dissection, and sometimes separated from the other parts; but, to all appearance, these coagulations have always taken place after death. This part of the blood coagulating, when taken out of the vessels, or after death, in the same chemical circumstances in which it remained fluid when the animal was alive, has given occasion to an opinion, that this fluidity is one of those properties superadded to the matter of the body by life. When it is taken out of the blood-vessels, it may be prevented from coagulating by saturating the whole blood with common sea-salt, and perhaps by some of the other neutral salts. Although the coagulable part of the serum and coagulable lymph have different properties, the coagulum formed from both is pretty nearly the same. The coagulum may be dissolved in water by boiling or putrefaction; and may be united with concentrated acids, with caustic alkalis, and calcareous earth, and with some metallic salts, into a substance soluble in water; but none of these can get into the system by absorption, either from the intestines, or any other part, so as to produce this effect. Both the superfluous water and serum are capable of being separated from the coagulable lymph by filtration in the body.

When the blood is received into a proper vessel, the coagulation of this part gives an appearance of solidity to the whole: but soon after the whole becomes thus apparently solid, part of the serum, of the superfluous water, and of the water which was contained in the coagulable lymph, oozes out from the whole mass, and brings along with it part of any extraneous fluid that may have been in the blood-vessels; leaving behind what is commonly called the red globules, the mucilage of the coagulable lymph, and any solid particles that may have been in the blood. This is called the spontaneous separation.

When the arteries are acting strongly, whether the whole habit be strong or not, the coagulable lymph is more fluid, and longer in coagulating. Of consequence, it lets the red particles, which are the heaviest part of the blood, fall down towards the bottom, before it coagulates; and upon the spontaneous separation the coagulum is divided into two parts; the upper consisting of the coagulum of the coagulable lymph alone (which has in this case been called the buff); the under, consisting partly of this and partly of the red particles.

Although part of the coagulable lymph would separate from the red particles, it may be prevented by taking the blood from a small vessel, or from a small orifice, or by letting it run along the skin, before it falls into the vessel into which it is received, or by receiving it into a vessel, the surface of which is large in proportion to its contents; as in all these cases the coagulation is forwarded. On the other hand, if it stagnate in the blood-vessel for some time before it is taken out, there will be a separation, when none would otherwise have happened. Whether the coagulable lymph separate in part from the red particles or not, it coagulates sometimes into a firmer, sometimes into a looser mass, generally in proportion to the strength of the system. All the substances which coagulate the serum have the same effect on the coagulable lymph; but none can be applied to it in the blood-vessels, in a sufficient degree of concentration to coagulate it, excepting by injection. The coagulable lymph is probably in itself colourless, insipid, inodorous, and incapable of stimulating. Whilst it remains in the blood-vessels it is chemically combined with a certain proportion of water, from which it cannot be separated but by coagulation, neither will it combine with a larger proportion. Water mechanically mixed with it does not alter its viscidity, so far as that effects the circulation or secretions. No other differences besides those already taken notice of are observable in its properties. The coagulable lymph and serum are both capable of putrefaction, and are converted by it into a mucilaginous matter not coagulable by heat. If this mucilaginous matter should undergo a further putrefaction, it emits a fœtid vapour, and is converted into saline substances, calcareous earth, and water.

Upon viewing the red part of the blood with a deep magnifier, in the solar microscope, as it circulates in the blood-vessels of a living animal, it appears to be divided into a number of small particles, which are apparently annular, and exceedingly flexible. While the animal is respiring, and the blood circulating, it is of a scarlet colour in the arteries, and of a Modena red in the veins; but if the respiration be stopped, that blood which circulates afterwards through the lungs continues of a Modena red. If it be taken out of the veins, kept moist, and exposed to respirable air, it becomes of a scarlet colour; if it be taken out of the arteries, and covered from the air, or if it stagnate in them, its colour is changed to a Modena red. Various other substances alter the colour of this part.

It seems to have a sweetish taste, to be inodorous, and void of stimulus. Its specific gravity is but a very little more than that of the serum or coagulable lymph. It is readily soluble in water, but not in the serum. It is not soluble in

a saturated solution of neutral salts. It is capable of undergoing the putrefactive fermentation, the first stage of which breaks it down into smaller particles, and renders it of a dark colour. It is afterwards converted into a mucilage, soluble in the serum.

The superfluous water in the blood is that diffused through the serum and coagulable lymph; and it contains a part, perhaps the whole of the salts. These salts are chemically combined with a part of it only, and this solution is diffused through the remaining part. The water diffused may be separated from the solution by filtration in the body. The solid part of the blood, left after evaporation of the water by a heat less than that of boiling water, amounts to from one fourth to one fifth of the whole.

A great variety of extraneous substances, both fluid and solid, may be introduced into the blood-vessels by absorption; but none of them in such proportion as to produce any alteration in the blood, except by fermentation. When any ferment is introduced into the blood-vessels, it acts upon a part of the blood only; the greatest part remaining to all experiment exactly the same as before. It may indeed be doubted whether any ferment acts on any part of the blood in the blood vessels, or whether ferments only act on extravasated fluids.

By fermentation, in this place we merely mean the conversion of one compound into another, by a new arrangement or combination of its elements. What is commonly called putrefaction consists of two fermentations, which we shall call by the names of the first and second stage.

All animal solids and fluids may be reduced by the first into a mucilaginous mass, soluble in water, and diffusible through any quantity of it. The red part of the blood first breaks down into smaller particles, before it is formed into a perfect putrescent mucilage. The first stage takes place without any effervescence. The second stage converts this mucilage into earths, and salts, a fœtid vapour, gass and water. The first and second stage of putrefaction take place in a small part of the blood, or it is destroyed by some other operation; for, after having coagulated the serum, if we squeeze out the water, and evaporate it, there is left a mucilaginous matter similar to that formed by putrefaction. The salts formed in the blood-vessels, excepting phosphoric ammoniac, may be formed by the last stage of putrefaction; and those formed by the last stage are found in the blood-vessels, excepting nitrous selenites, and nitrous ammoniac. This mucilage, and these salts, are always carrying off by urine; the present blood is always diminishing, and the vessels require a fresh supply from the food. The blood is always in the most powerful circumstances of putrefaction; which are, a heat of 98 degrees of Fahrenheit's thermometer, fluidity, a moderate exposure to air, and motion: but it is prevented from putrefying by the action of the vessels; nor can any ferment, or other circumstance, induce the fermentation, till this action is altered, except perhaps the introduction of chyle, intermixed with putrid matter.

In diseases, the first stage often takes place in part of the blood; the second stage sometimes, although but seldom.

*Fluids of the digestive Process.*

Digestion is the conversion of the food into chyle, and afterwards into blood. The food may consist of farinaceous or mucilaginous vegetable substances, native vegetable acid, sugar, expressed oil, animal solids, or animal fluids, containing a mucilaginous matter. These substances may be digested, if they be taken singly, or if they be mixed together.

The blood formed does not differ sensibly in its properties, whether the one or the other of them be used singly, or several of them together; provided the organs of digestion be sufficiently powerful to convert them into blood.

If the food be solid, it is generally broken down by the teeth, or by some other apparatus. But mashing it down with water is not sufficient to alter its chemical properties, and convert it into chyle and blood.

It is mixed in the stomach with the watery fluids we drink, and with the mucilaginous watery fluids secreted by the salivary and other glands. It is sometimes dissolved in water before it is used: but it is often rendered solid by a previous preparation, or coagulated by a substance secreted in the stomach. Simple solution in water does not convert it into chyle or blood.

If it be previously dissolved in water, it affords less nourishment than if exhibited solid.

It is necessary that it remain in the stomach for some time, in order to its digestion; and the only process it can go through in the organs of digestion, that is capable of altering its chemical properties, is fermentation. Its fermentation is not attended with effervescence in a healthy stomach. Neither is there any vapour found in the intestinal canal in health.

If vegetable food be used, an acid is often produced, but not in perfect health. This acid is destroyed in the duodenum by the bile. If animal food be used alone, no acid is produced. But the stronger the stomach, and the more perfect the digestion, the less acid is formed from vegetable food.

No stage of the putrefactive fermentation takes place, during the conversion of it into chyle and blood, if the digestion be perfect.

The fermentation which takes place is peculiar to the organs of digestion, and has never been produced by any artificial means yet attempted.

The fermentation which takes place in the stomach forwards the solution of solid food in the watery menstruum: and these dissolve sooner in the stomach than they can be dissolved in water in the same heat, by any means hitherto found out.

If the stomach do not act properly, solid food remains undissolved; vegetable, and mixtures of vegetable and animal substances become acid; animal substances putrefy; a quantity of air is separated; and the food is not digested and converted into chyle.

Only that part of the food which is digested affords nourishment; the nourishment therefore is in proportion to the food and the digestion. But when food, either from its quantity or quality, cannot be digested, it is apt to occasion great disturbances in the system, while it is contained in the stomach and intestines.

The only sensible alterations produced in the blood by different foods, are in its quantity; or in the proportion of superfluous water; or that sometimes a long use of animal food, especially if it be preserved by salt, brings on a degree of putrefaction.

The chyle is formed from the food in the intestines, and absorbed by the lacteals.

The whole fluid absorbed is not chyle, but a mixture of chyle, and the solution of those substances which were simply dissolved in water without being digested.

*Quere*, Whether a simple solution of mucilaginous, animal, or vegetable substances can be converted into blood, without being formed into chyle in the stomach and intestines?

Chyle is fluid while in the lacteals; when exposed to the air it coagulates; it is rendered white from a mixture of expressed oil.

When coagulated, a fluid may be squeezed out, which probably contains a coagulable matter, and sugar.

*Fluids secreted in the Body.*

The secreted fluids either exist in the blood-vessels, being mechanically mixed with, or diffused through the other fluids, and require only a mechanical separation; or they do not exist in the blood-vessels, their elements only being contained there: but these elements are not combined, so as actually to form the secreted fluid. It is therefore requisite, that some chemical operation should take place in the secretory organ, by which the elements shall be combined, so as to form the matter secreted.

The fluids separated mechanically are, 1. The matter of the insensible perspiration. 2. The urine. 3. The sweat. 4. Perhaps the milk. All these are evacuated from the body.

The fluids formed in the secretory organ, by a chemical operation, are, 1. The mucus. 2. The saliva. 3. The pancreatic juice. 4. The semen. 5. The bile. 6. The wax in the ear. 7. The sebaceous matter. 8. The coagulating matter of the stomach, &c. These are retained and employed in the body.

The matter of insensible perspiration is separated from the surface of the lungs, and from the skin by evaporation. The quantity evaporated depends upon the quantity of superfluous water in the blood-vessels, the heat of the air, the quantity of air applied, and the contraction or relaxation of the vessels, from which the evaporation takes place.

When the body is in its natural state, that part of the insensible perspiration, which is capable of condensation, consists of water, with a very small proportion of a mucilaginous matter and essential oil, and sometimes perhaps volatile alkali, and gas.

There is no reason to suppose, that any matter flies off that cannot be condensed, excepting gas, from any experiment hitherto made.

Should any other substance, capable of emitting vapour in the heat of the human body, get into the blood-vessels, or be formed on the surface of the skin, lungs, or in any of the passages of the air in breathing, it may be mixed with the insensible perspiration.

Some of these substances may be putrid vapour, variolous, morbillous, and other infectious matters, alcohol, and other volatile extraneous substances, &c.

The matters thrown off by insensible perspiration may be evacuated by the other excretions.

The health is not in proportion to the quantity of insensible perspiration.

The urine, in the common state of the body, is a transparent brownish fluid, which, upon cooling, has a mucilaginous matter separated, capable of being redissolved in heat, which we call the separating mucilage. In health, this separating mucilage is generally in such quantity as to remain suspended in the urine after its separation, forming what has been called the cloud.

It is sometimes totally absent in health, but much more frequently in diseases; sometimes it is in quantity sufficient to carry the cloud to the bottom, and form a mucous sediment; and sometimes it falls down in a flaky powder, and forms what has been called a lateritious sediment, which is commonly of a brick colour, and now and then white. This kind of sediment often takes place on the going off of acute diseases; but it also happens in health, and while diseases subsist in their full force, particularly when they affect the urinary passages, or parts near them.

Sometimes the separating mucilage is separated in a powder, remains suspended in the urine, and renders it turbid: and after this separation, if the urine be filtrated from it, it is transparent, consisting of water which contains a mucilage, and salts.

1st, A mucilage, similar to that formed by the first stage of putrefaction; which is of a brownish colour, and gives the greatest part of the colour to the urine. Its quantity varies considerably; but the proportion of it in the urine is always small. If the water be evaporated from it, it will redissolve, and it may be diffused through any quantity of water in any heat. It is not coagulable.

2dly, The salts of the urine are common salt, common sal ammoniac, phosphoric ammoniac, sulphuric selenites, and muriatic selenites.

Watery fluids may pass through the blood-vessels, and by the kidneys, hardly carrying off any thing with them, especially if large quantities be drunk at a time, and the external vessels be contracted.

Sometimes calcareous earth is found in the urine, suspended by mechanical mixture, or at least not combined with an acid.

Indeed any extraneous substance, soluble in water, that may get into the blood-vessels, may be evacuated along with the urine; such as acids, alkalies, neutral and other saline substances; infusion of rhubarb, and other mucilaginous vegetable juices; bile, pus, and other fluids formed in the body.

If the kidneys be relaxed, or stimulated, chyle, serum, coagulable lymph, and even the red part of the blood may be thrown out. The red part may also be broken down by putrefaction, and pass off by the kidneys of a very dark colour, disturbing the transparency, and sometimes forming a sediment.

If the heart and arteries act more strongly, or frequently, than they do in their natural state, a quantity of expressed oil comes away with the urine, and forms a film on the surface, or a ring round the vessel into which it is received.

The urine always contains a portion of the essential oil of the urinary passages, and sometimes a portion of their mucus.

As far as we are capable of judging of the nature of the sensible perspiration from the very small quantity that can be collected, it contains nearly the same substances as the urine; only that, instead of the essential oil of the urinary passages, it is mixed with the sebaceous matter of the skin, which gives it a degree of whiteness, and a smell different from that of the urine.

Milk is secreted naturally in the breasts of women, for the nourishment of their young, sometimes during pregnancy, and always after childbirth. There are said to have been instances of its being secreted at other times, and from other

parts of the body. It is a whitish fluid, which separates into two parts, upon being left at rest in a moderate degree of heat: the upper part consists principally of expressed oil, with a mixture of the other part, and is whiter and more opaque, and is called the cream. The under part consists of a solution of coagulable matter and sugar, in water; with a small mixture of expressed oil, and is called the skim milk.

The expressed oil is fluid in the heat of the human body, but solid in the heat of the atmosphere. It is only mechanically mixed with the other part. It is tinged with, and receives a flavour from, the essential oil of the food and of the body. It is found not only in different proportions in the milk of different women, but also in the milk of the same woman at different times, and even in that which issues from the different excretory ducts of the glands of the same breast.

The coagulable matter only differs from the coagulable matter of the serum in its coagulability, and its proportion to the water. It is not coagulable by a less heat than that of boiling water, and by that only, if the water be evaporated from it. It may be coagulated by acids, alcohol, several metallic and aluminous salts, and vegetable juices; but it requires that they should be applied to it in a greater degree of co-centration than the serum does, in order to its coagulation.

Heat assists the coagulating power of these substances; and it is readily coagulable by the coagulating juices of the stomach, and coagulates in the stomach of a living animal, whether any acid be contained in it or not.

The sugar contained in the milk does not differ in its properties from that of the sugar-cane, but its proportion is always small; and when a woman makes use of vegetable food, it seems to be in greater proportion than when she uses animal. The milk of a bitch, using animal food alone, contains sugar.

If milk be kept for some time exposed to the air, and in the heat of the atmosphere, or of the human body, the sugar ferments, and is converted into vinegar, which coagulates the coagulable matter. The same change may take place in the breast, if it stagnate there for some time, or if the woman be suddenly affected with any of the passions of the mind that are attended with anxiety.

If blood be taken from the arm after a full meal, the serum is often mixed with a substance which gives it a degree of whiteness and opacity like milk.

The milk is secreted after a full meal in larger proportion than after a woman has fasted for some time. In the latter case, the proportion of the expressed oil, coagulable matter, and sugar, likewise diminishes, and the milk contains, besides these, the neutral salts of the blood, and acquires a bitterness from the sebaceous matter of the glands of the nipples.

In some women the milk always contains the salts of the blood, or the sebaceous matter of the nipples; and this not only gives it a bitter taste, but also sometimes a yellowish colour, and a thicker appearance.

The milk may contain any substance which is thrown into the stomach, simply dissolved in water, and absorbed by the lacteals, without going through the digestive fermentations, and being converted into chyle.

*Mucus.*—The surfaces of the membranes exposed to any extraneous matter, such as the skin and internal membrane of the mouth, nose, lungs, œsophagus, stomach, intestines, urinary passages, &c. are covered with mucus, which is a fluid of an adhesive viscidity approaching to a solid, and of greater viscidity in one part of the body than in another. It is a compound of a mucilage and water. It is more or less viscid, according to the quantity of water with which it is combined. It is of different degrees of viscidity in different parts of the body. It will not combine with more water than what is already contained in it: neither can its viscidity be altered by digesting it with water, unless it begin to putrefy; nor can the more viscid mucus of one part be converted into the less viscid of another.

If the water be evaporated from it by a gentle heat, the mucilage remains solid; if this be immersed in water, it will absorb that quantity which evaporated from it, but no more, and it will regain its former fluidity and viscidity.

For the most part, it contains either no neutral salts, or so small a proportion as cannot easily be rendered sensible to experiment. It is colourless, insipid, inodorous, and incapable of stimulating.

It combines with concentrated sulphuric, nitric, and muriatic acids, with concentrated solutions of some metallic salts, and also with concentrated or diluted solutions of caustic alkalies, and caustic calcareous earth, forming compounds soluble in, and diffusible through, water.

Acids, and some metallic salts dissolved in water and concentrated, but not to that degree as to dissolve it, alcohol and aluminous salts, coagulate it. It is also coagulable by the heat of boiling water, but not by a less degree of heat.

The mucus defends the membranes from being so much stimulated by any application as they would be, if they were not covered with it.

If the secretion be suddenly increased, the matter secreted is often a thin watery fluid, containing the salts of the blood, and in consequence of them, capable of stimulating; and the membranes are not defended from external applications.

If a greater secretion should continue than what naturally takes place, the mucus retains the salts, but often acquires a viscidity, and becomes incapable of being diffused through water: its colour, also, often grows white, greenish, or yellow; and now and then it acquires a smell: especially if the mucous glands or membrane be inflamed.

The *saliva* is secreted by several glands opening into the mouth; and the principal part of it is thrown down into the stomach, to answer some purpose in the digestion of the food.

It is a fluid of an adhesive viscidity, with difficulty diffusible through water. It consists of water, a mucilage similar to that of the mucus, and the salts of the blood, but not in so large a proportion as they are contained in the serum. It contains a larger proportion of water than the mucus.

In its other properties it is similar to the mucus, in as far as they have been investigated.

The *pancreatic juice* appears to be similar to the saliva, except that it is less viscid, and contains a larger proportion of the salts of the blood. Both are probably watery menstrua for the solution of the food in the stomach and intestines, their viscidity preventing them from being absorbed before they produce that effect.

They have been said to act as ferments during the digestion; but as the fermentations of the stomach have never been made to take place out of it, we cannot judge of this by any experiment hitherto communicated to the public.

*Bile.*—The blood from which the bile is formed has probably gone through one circulation, without being exposed to the air in the lungs, or mixed with the fluids brought by the lymphatics from the different parts of the body. The blood passes through the vessels of the abdominal viscera, before it arrives at the liver; but it does not take up any substance from them, or at least not in such a quantity as to be sensible to any experiment yet made public; but, on the contrary, it appears perfectly similar in all sensible qualities to the blood returning by the veins from the other parts of the body.

There is no appearance of bile in the vena portarum of a living animal.

When bile in the jaundice is contained in the blood-vessels, it is secreted by all the secretory organs, and it is evidently contained in all the secretions.

The bile is formed from the blood in the secretory vessels of the liver. It runs along the hepatic ducts into the ductus communis choledochus, and thence partly into the duodenum, and partly into the gall-bladder. It continues for some time in the gall-bladder, and there becomes more perfect in its properties; thence it returns into the ductus communis choledochus, and passes into the duodenum. It is a fluid of an oleaginous viscidity, consisting of a solution of a solid matter in water. If the water be not evaporated from it, no alteration is produced in it by any heat between 32 and 112 degrees of Fahrenheit's thermometer.

The bile in its natural state is diffusible through any proportion of water: and if the water be evaporated from the solid part by a heat not exceeding 112 degrees of Fahrenheit's thermometer, it is then also soluble in, and diffusible through, any quantity of water.

The solid matter of the bile melts if it be heated, and is decomposed if the heat be increased. If it be distilled by itself, it yields a larger proportion of empyreumatic oil than any of the other fluids, except the expressed oil, and perhaps the red part of the blood. It is of a yellow colour, and a sweetish bitter taste.

When it is not combined with more water than it generally is in the gall-bladder, it does not putrefy more readily than the blood; but if it be diluted with water, or watery fluids, it putrefies more readily.

Acids, and some of their compounds, decompose it, and precipitate from it a resinous matter. The acidity of the acid is lost by its combination with the other part; but if more acid be employed than what is necessary for the decomposition, the acidity of the superfluous quantity remains. The matter precipitated has the peculiar smell of the animal.

It is solid in the heat of the atmosphere, melts in a moderate degree of heat, and burns very readily. It is not soluble in water. It is partly soluble in alcohol.

If the passage of the bile into the duodenum be stopt, acidities are apt to take place in the intestinal canal, the peristaltic motion does not go on properly, the fæces lose their peculiar colour and smell, and often acquire a more putrid fetor, and the digestion is hurt, but not entirely prevented.

The properties of the other secreted fluids have not been sufficiently investigated by experiments for us to be able to give any satisfactory account of them.

ANIMAL SOLIDS.

These are a compound of mucilage and water. They are naturally flexible; but, if the water be evaporated from them by a gentle heat, they become friable. The water, chemically combined, cannot be separated from them by expression.

Exposed to about a red heat, they are decomposed; and if they be distilled by themselves, volatile alkali, empyreumatic oil, water, and calcareous earth, are formed. When free from essential oil, blood, and the salts of the fluids, they are colourless, insipid, and inodorous.

They differ in their flexibility and elasticity. Fibres and membranes are readily flexible, not capable of being broken by bending, and have a less degree of elasticity. Cartilage is less flexible, capable in general of being broken by bending, and more elastic. Cartilage often supplies the place of bone in young animals.

Heat, dilute acids, neutral salts, alcohol, metallic and aluminous salts, astringent juices of vegetables, and several other substances, coagulate them, i. e. separate part of the water chemically combined, and of consequence contract them, diminish their flexibility, and harden them. Substances coagulating the animal solids are called astringents.

If they be exposed to a freezing cold, the water freezes; and, upon thawing, their texture is found to be altered.

Concentrated sulphuric, nitrous, and muriatic acids, caustic alkalies, even in a diluted solution, quick lime, and several of the metallic salts, combine with them into a substance diffusible through, or soluble in, water; and destroy their texture at the same time.

They are capable of putrefaction in the same manner as the animal fluids.

GENERAL STRUCTURE OF THE HUMAN BODY.

*The Blood-vessels.*

There are cavities and tubes in the body, viz. the heart and blood-vessels, in which the red part of the blood, the coagulable lymph, and part of the serum and superfluous water, are usually contained. They consist of the heart, arteries, capillaries, and veins; for which see ANATOMY.

No red muscular fibres appear on the arteries, capillaries, or veins in the human body.

These vessels are all of them elastic, and capable of being distended, so as to contain a larger quantity of fluid than what is necessary to render them cylindrical.

Their elasticity is not sufficient to overcome the weight of their sides, and keep them cylindrical, if they be not filled with a fluid, excepting in that part of the aorta nearest the heart.

When an animal is dead, and no chemical or mechanical change has taken place in the vessels, the elasticity is the same as when the animal was alive.

When an animal is dead, and the vessels act by their elasticity alone, they are incapable of contracting to half the size they are of at their utmost distension, supposing them to continue cylindrical.

When an animal is alive, the blood-vessels are always cylindrical, excepting when they are compressed by a considerable external force. They are always full of blood.

When an animal is alive, the veins, capillaries, and small arteries are sometimes contracted to less than half the size they are of at other times, which cannot happen from their elasticity; therefore the veins, capillaries, and small arteries, in a living animal, have a contractile power, independent of their elasticity, by which they adapt themselves

to the blood, and continue cylindrical. This power is similar to the muscular power.

When the vessels contain more blood, they become longer, or their diameter is enlarged, or both; and *e contrario*, when they contain less blood, they become shorter, or their diameter diminishes, or both. The contractile power of the vessels is capable of diminishing either their length or diameter.

When an animal dies, the arteries and veins lose their cylindrical form, and are flattened, and the capillaries contain less blood, so that the blood sufficient to fill the vessels when the animal was alive is not capable of filling them after he is dead; therefore

The arteries, veins, and capillaries of a living animal are commonly contracted to a greater degree than they can be by their elasticity.

The elasticity is commonly endeavouring to distend them, but is always overpowered by the contractile power depending on life, which adapts the size of the vessels to the quantity of blood contained in them.

If the vessels be emptied to such a degree that they cannot adapt themselves to the blood, and continue cylindrical, the animal dies. The most essential effort of the living power is to adapt the vessels to the blood.

*The Circulation, and the Powers producing it.*

The blood passes from the left auricle of the heart into the left ventricle, from the left ventricle into the aorta, and from thence, by the smaller arteries, to the capillaries in every part of the body; from these it returns by the veins to the right auricle of the heart. The blood, for the most part, moves in one uniform direction in each artery, viz. from the heart towards the capillaries: it also moves in one uniform direction in each vein, viz. from the capillaries towards the heart; but although it moves in general from the arteries through the capillaries into the veins, yet its direction in any one capillary may be, and often is, altered and reversed.

Both the general velocity with which the blood moves through the whole system, and the proportional velocity of its motion in particular vessels, are constantly varying.

The force with which the blood moves in the veins, and the muscular contraction of the auricle which takes place during the relaxation of the ventricle, propels the blood into the ventricle.

When a certain quantity of blood is propelled into the ventricle, its muscular fibres contract, being probably stimulated thereto by the blood.

This contraction of the muscular fibres of the left ventricle diminishes, or obliterates it, and propels the whole, or part of the blood contained in it, into the aorta; the valve placed at the opening of the auricle into the ventricle preventing its return into the auricle.

When the ventricle has emptied itself into the aorta, it relaxes, and receives a fresh quantity of blood from the auricle; the blood being prevented from returning from the aorta by the valves placed at its opening into the heart.

The action of the heart tends to produce an equal and uniform circulation in every part of the body. Yet the circulation doth not depend on the action of the heart alone.

The circulation is not equal and uniform through the whole body; but, the same quantity of blood flowing from the heart, a greater proportion of it sometimes circulates through one part, sometimes through another.

If the heart be the sole power propelling the blood forward, the circulation can only be increased in any one part by an increase in the size of the vessel, or a removal of some obstruction to the circulation there, or a diminution of the size of the vessels, or obstruction to the circulation in the rest of the body; and *e contrario*, the circulation can only be diminished in one part by a diminution of the size of the vessels, or obstruction to the circulation there, or an increase of the size of the vessels, or a removal of some obstruction to the circulation in the other parts of the body: but it will appear, from what follows, that without any of these things happening, the circulation in a part may be diminished or increased, and therefore that the heart is not the sole propelling power.

The causes capable of increasing the circulation in a part are generally such as tend to excite muscular motion, and are called stimuli. Some part of the body brought into action by these is capable of increasing the circulation independent of the action of the heart. This force must reside in the arteries or capillaries.

The arteries are endowed with a muscular motion, by which they may increase the circulation in a particular part, or assist the heart in the general circulation of the blood; at each contraction of the heart they are distended; at each relaxation they contract.

This alternate contraction and dilatation might depend on their elasticity; but if so, their size at their utmost contraction in the living body should be equal to that produced by a fluid injected into them, with a force capable of overcoming the resistance the blood meets with in the capillary vessels, which, in the human body, is probably equal to about eight feet perpendicular height of water.

But their size, even at their utmost state of dilatation, is less than that produced by a fluid injected into them, with a force equal to one foot perpendicular height of water, when the animal is dead. Therefore their contractions and dilatations do not depend on their elasticity. Or the argument may be taken in this manner; the vessels, when of the largest size in the living body, are less than they are in the dead body; but as the elasticity remains perfect in the dead body, they could never be contracted by it in the living.

If the arteries contracted and dilated by their elasticity, no additional force could be applied from their contraction and dilatation; since the heart would lose more force in distending the arteries than they would re-apply to the blood in contracting.

If upon being distended by the blood thrown into them by the heart, they are excited to a muscular contraction, and when they have performed this contraction relax, and, like the ventricle of the heart, receive the blood easily into them, and, when they are again distended, are excited to a second contraction, they may apply an additional force to that of the heart, so as to promote the circulation through the whole body.

If such contractions and dilatations be greater in any particular part, they will promote the circulation in that part; in as much as, when they are relaxed to a greater degree, they will suffer the blood to pass through them more readily into the capillaries; and, when they contract, they will empty themselves more thoroughly into the capillaries.

The arteries have a muscular contraction and

dilatation, similar to that of the ventricles of the heart, by which they apply an additional power to that of the heart, so as to promote the general circulation through the whole body, and often to increase the proportional circulation in a particular part.

As the capillaries do not contract or dilate alternately, and as the direction of the blood in any one of them is quite undetermined, this additional force cannot depend on their action.

The motion of the blood is regulated by the action of the heart and arteries, and the contraction of the capillary vessels; and these are measured by the pulse.

*The Pulse.*

The indications of the pulse are of great importance in medicine; for by these we can judge of the state of the circulating system, the phœnomena of diseases, the patient's strength or weakness, &c.

| It indicates, | by | It is called |
|---|---|---|
| 1. The strength of the contraction of the heart, | Strength, | Strong. |
| | Weakness, | Weak. |
| 2. The quantity of blood thrown out at each contraction, | Fulness, | Full. |
| | Smallness, | Small. |
| 3. The number of contractions, | Frequency, | Frequent. |
| | Slowness, | Slow. |
| 4. The regularity of its action as to strength, quantity or frequency, | Regularity, | Regular. |
| | Irregularity, | Irregular. |
| | Intermission, | Intermittent. |
| 5. The strength of the action of the arteries, | Hardness, | Hard. |
| | Softness, | Soft. |
| | Redoubling, | Redoubling. |
| | Trembling, | Trembling. |
| 6. The irritability of the vessels, | Quickness, | Quick. |
| | Regularity, | Regular. |
| | Slowness, | Slow. |
| 7. The medium diameter of the arteries, | Dilatation, | Great. |
| | Contraction, | Small. |
| 8. The quantity of blood in the vessels, | Oppression, | Oppressed. |
| | Smallness, | Empty. |
| 9. The contraction of the capillaries, | Obstruction, | Obstructed. |
| | Freedom, | Free. |

This table needs no explanation; yet it is in fact no easy matter, in many cases, to make the proper distinctions. In attempting to decide on the state of the pulse, it is of importance too, to know the usual pulsations of the patient when in health; as these differ materially in different subjects.

For the structure of the lungs, and their blood-vessels, as also of the exhalants and absorbents, we refer to the article ANATOMY.

Some of the lymphatics terminate in veins, which are similar in their structure to those which terminate in the thoracic duct.

*Powers producing the Extravasation and Absorption of the Lymph.*

The contractile power of the blood-vessels squeezes the lymph into the cellular membrane and cavities.

The quantity thrown out is in proportion to the force of the circulation, the fluidity of the substances contained in the blood-vessels, or the quantity of the more fluid substances, and the degree of contraction of the capillaries and exhalants.

The joint of a lymphatic opening into a cavity, endeavours to fill itself from that cavity by its action as a capillary tube, the valves preventing the return of the lymph from the other part of the lymphatic. In like manner, a lymphatic may fill itself entirely from the cavity in which it terminates; but its action as a capillary tube will not tend, in the smallest degree, to propel the lymph into the veins.

It is most probable, that the joint of the lymphatic, next to the cavity, having absorbed a sufficient quantity of lymph to fill it, is stimulated to contract and propel the fluid into the next joint, and so on to the thoracic duct, or vein in which it terminates; and having emptied itself, and being relaxed, it fills itself again from the cavity, and so continues to act: for there is apparently no other power in the body capable of producing a regular flow of the lymph through the lymphatics into the blood-vessels.

For in a living animal, where the veins are contracting, and pressing upon the blood, if one end of a capillary tube terminate in a vein, and the other in a cavity; and if there be no action in that tube, excepting that which arises from its being a capillary one, or from the motion of the blood in the vein; if there be any motion in that tube after it is full, it will always be from the vein into the cavity, and never from the cavity into the vein, let the tube be of any size or shape whatever.

Further; the alternate pressure of the lymphatics, arising from the alternate contractions and relaxations of the blood-vessels, or muscles, is not sufficiently powerful, universal, or equal, to produce a regular flow of the lymph through the lymphatics into the blood-vessels.

Neither does the cellular membrane and cavities force the lymph into the lymphatics, and through them into the veins.

The extravasation of fluids from the blood-vessels into the cellular membrane and cavities, and their reabsorption, generally take place in the above manner.

Sometimes the coagulable lymph is thrown out by the exhalants; and then it most commonly coagulates.

If it coagulate, it cannot be taken up by the lymphatics, till it be redissolved, which happens in many cases; and it is then absorbed much sooner than it can be rendered soluble in water, by putrefaction when out of the body. At other times it continues in the cavity for many years.

The red part of the blood is also sometimes thrown out by the exhalants. In this case, its particles are broken down probably by the first

stage of putrefaction, and it is afterwards reabsorbed. The same things may happen, if the red particles and coagulable lymph be extravasated in consequence of the rupture of a blood-vessel.

In particular parts, as in the corpora cavernosa penis, the extravasation and absorption are probably performed in a different manner, and by different vessels.

All absorbent vessels must have a power of propelling the fluids into the blood-vessels, sufficient to overcome the force of their contraction, by which they endeavour to propel the blood out of any opening.

*Properties depending on the Life.*

Inanimate matter is endowed with properties peculiar to, and which distingush its different species from one another, and these are called chemical.

Figure, motion, and other accidental circumstances, may give to any species of matter indiscriminately other properties, and these are called mechanical.

Animated matter of the same species may have new or different chemical properties, or lose some of those it had when inanimate, in consequence of life, and which are immediately altered when it is deprived of it. In animated bodies, there are also powers of action, and laws of motion, different from those mechanical ones found in inanimate matter; and there are also other properties, which have no resemblance to chemical or mechanical. All these we call properties depending on life.

*Heat of the Body.*

The bodies of mammals have a disposition to maintain the same degree of heat nearly, and the heat of the same species is generally the same, especially in mankind.

The common heat of the human body in health is 98 degrees of Fahrenheit's thermometer. It is the same throughout the whole body, excepting that a cold substance applied to the skin diminishes its heat: and the heat of the blood, flowing from an opened vein in a limb that is exposed to a cold atmosphere, is reduced two or three degrees.

Otherwise the heat continues the same, whether that of the atmosphere, or other surrounding bodies, be greater or less than ninety-eight degrees, unless when it produces a disease, the consequence of which is an increase or diminution of the heat of the body.

The body is capable of resisting different degrees of external heat or cold, according to the habit it has acquired. There are instances of its bearing 20 degrees below 0 of Fahrenheit's thermometer, with very moderate clothing, and 115 above, without alteration, The heat may be increased or diminished by alterations in the body itself, especially in diseases. It has seldom been observed to be less than 94, or more than 110 degrees of Fahrenheit's thermometer. Mr. G. Hunter was never able to raise it higher than 99 degrees, or one degree above the natural temperature.

It is here unnecessary to enlarge on the structure of the nervous system, as we have already described it under the article ANATOMY.

*Sensibility, Mobility, and Irratibility.*

*Sensibility* is a property of the body, by which applications to it excite sensations in the mind. *Mobility* is an original power of motion, by which certain parts of the body are capable of moving themselves without any external motion imprest. *Irritability* is a property of the body, by which applications to particular parts excite a motion in the moveable parts, independent of the motion imprest.

The *sensibility* depends on a part's being connected with the brain by the nerves; for, if the nerves going to any part be cut through, the sensibility is lost. If the nerves going to any part be moderately compress, the sensibility is diminished; and if the nerves be compress strongly, the sensibility is lost. If the pressure be soon removed, the sensibility recurs. If the pressure be continued for a long time before it is removed, the sensibility returns more slowly, or not at all.

Pressure on the brain may diminish the sensibility of the whole body. If a small branch of a nerve be cut through, so as to take off the sensibility of a part of the skin, it may be restored in time. The sensibility may be impaired, or lost, without any sensible pressure on the nerve, or alteration of its structure.

When there is no wound in the body, the sensations generally appear to be in the place where the application exciting them is made. But to this law there are many exceptions.

If an extremity be cut off, an application made to the stump may produce sensations, which appear to be in the part amputated.

A sensation may be excited apparently in a part by an affection of the nerve going to it, the body being whole. An application made to one part may excite a sensation in another, when there is no apparent communication between the nerves going to them.

Every part of the body is capable of sensation in a sound or morbid state. The bones and cartilages do not appear to be sensible in a sound state, whatever application be made to them; but in a morbid one they may become sensible. All the other parts of the body appear to be sensible in a sound state; for the distension of a part considerably beyond its present disposition to contract, either by its muscular power or elasticity, is capable of exciting sensations in every other part of the body.

There are applications which are capable of exciting sensations in one part, that produce no such effect in another.

Some of the sensible parts are only capable of sensation from distension in a sound state, such as the membranes. One part may be sensible to an application to which another is not, and the second part may be sensible to another application to which the first is not; as the effluvia of musk do not affect the eyes, although they affect the nostrils. Some parts of the body are only capable of the sensation of pain; others are capable of various sensations, of which pain is always one.

Some applications are capable of exciting pain only; others may excite various sensations. Every sensation, excited in a very great degree, is painful, and several are also painful from being very weak.

Those parts of the body which are capable of a variety of sensations are generally called the organs of the senses. These are, the skin, the mouth, the nostrils, the eyes, the ears: the stomach is capable of several sensations besides pain, but not of so great a variety as the organs of the senses. Some other parts of the body are also capable of some sensations not painful.

All the sensible parts may have their sensibility increased or diminished.

*Mobility* and *Irritability*.—Parts capable of original motion are called the moving parts. In many

parts capable of original motion there are red fibres called muscular fibres; but in some of the parts capable of original motion no such fibres have hitherto been demonstrated.

All the parts of the body are not capable of original motion. The muscles, blood-vessels, lymphatics, secretories of the glands, and skin, are capable of original motion.

The moving parts are capable of contracting beyond that degree of contraction which would arise from their elasticity.

All the actions of the body, and all the power which it exerts, depend upon the contraction of the moving parts.

When a muscular fibre, or any other moving part, continues in action for a considerable time, it does not in general exert one continued contraction, but a number of alternate contractions and relaxations. The relaxations, when the body is strong, or the whole strength is not exerted, are often hardly distinguishable; but when the habit is weak, or the whole force exerted, they become very apparent. A contraction may however probably continue for a very long time, without any intermediate relaxation; as a spasm.

When any motion takes place in consequence of a relaxation, it is from the elasticity or weight of the part, or from some external power.

The original motions are produced by volition, ideas of the mind, or certain external applications called stimuli.

There must be the same intercourse, which is necessary for sensation, between the moving part and the brain, by means of the nerves, to render volition capable of exciting a motion in it.

Many of the moveable parts are incapable of being put in motion by the will. The will indeed may acquire a power over a moving part, which it could not affect originally.

An idea of the mind may excite a motion independent of, and contrary to, the will, provided the part be connected with the brain by the nerves

The motions excited by the will are called voluntary motions: those excited by ideas or stimuli, independent of, or contrary to, the will, are called involuntary or spontaneous. All the parts of the human body capable of voluntary motions have red muscular fibres.

The will and ideas are both capable of producing contractions and relaxations in the moving parts.

If the communication between the brain and a moving irritable part be cut off, by cutting through the nerve, a motion may be still excited in it by a stimulus: hence stimuli may excite motion without affecting the brain; and therefore all the motions excited by them are not begun in the brain, and carried along the nerves to the moving part.

If a nerve be cut through, so as to leave a portion of it adhering to a moving part, a stimulus applied to the part of the nerve adhering may excite a motion in the moving part. Hence the action of a nerve upon a part may excite a motion in it; and the motions excited by the nerves do not all arise in the brain.

If the communication between the brain and a moving part by the nerves continue, a stimulus applied to the brain may excite a contraction of the moving part.

When a stimulus produces a contraction in a moving fibre, the force of that contraction is often far greater than the force with which the stimulus was applied. Therefore, when a stimulus excites a motion, it is not in consequence of a communication of the power employed in applying that stimulus: nay, the motion may be the very reverse of that which would have been produced by the exertion of that power.

When a stimulus, applied to a nerve, produces a contraction in a moving fibre, it is a question whether the motion is excited in the nerve, and communicated to the fibre, or produced immediately in the fibre, without any motions being excited in the nerve: for in this last there is often no apparent motion excited.

It has been conjectured by some, that the motion was communicated by a fluid flowing through the nerves as tubes; by others, that it was communicated by vibrations; and by others, that it arises from an elastic vapour surrounding the nerves; but none of these conjectures are founded on experiment, neither are any of them any ways capable of accounting for the appearances.

If the brain be not diseased, and two parts of the body communicate with it by the nerves, as for sensation, an application made to one of these parts may excite a contraction or relaxation in the other, although none of the substance applied be carried from the one to the other, and although no sensation be excited by the stimulus. Hence a medicine, applied to one part of the body, may produce an effect upon another, although none of that medicine be carried to the part on which that effect is produced.

The effect of an application upon a part at a distance from that where it is made may be the same which it would have produced if applied to that part, or it may be the reverse, or totally unconnected with it. An application to one part may produce a motion in another, although it would have had no effect if it had been made to the part itself. A stimulus applied to a part incapable of original motion may excite a motion in a moving part at a distance.

If the communication between the brain and any part of the body, by means of the nerves, be cut off, application made to that part will not affect the other parts, nor will application to the other parts produce motions in that; unless the nerves be cut off from a muscle whose fibres have been accustomed to contract at one and the same time, such as the heart. In that case, if you stimulate one of these fibres, the whole are brought into immediate contraction; those not stimulated contract, to all appearance, as soon as the one to which the stimulus is applied.

The motions produced by the application of stimuli to moving and irritable parts are apparently the same, whether the part be connected with the brain by the nerves or not; excepting that the motions excited become more languid, after the moving part has been separated some time from the brain, and at last the power of motion in it is entirely lost in quadrupeds.

The same things are true of the motion excited by the application of stimuli to the nerves going to a moving part. Hence, it is probable, that the motions excited by the application of stimuli to a moving and irritable part, or to the nerve going to a moving part, do not arise in the brain, but immediately in the part; the brain in this case only keeping up the life of the part, and rendering it capable of motion.

The parts on which stimuli are capable of acting, so as to produce motion, are called the irritable parts. All the parts of the body are irritable in a sound state, excepting the bones, cartilages,

and tendons: and all the parts of the body may become irritable in a morbid state.

Stimuli may produce motion in a distant part, when applied to a part incapable of original motion; or, in other words, all the irritable parts are not moving parts.

An application that produces relaxation, or diminishes contraction, is called a sedative. A substance may act on one part as a stimulant, on another as a sedative: and a substance may act on one part as a stimulant or sedative, and have a less effect, or none at all, when applied to another, although otherwise equally irritable. Such stimuli are called specific.

There are some parts upon which stimuli in general produce greater effects than they do upon others. A greater number of substances act also upon these parts. The membranes, ligaments, and blood-vessels, excepting the heart, are incapable of being affected by any other stimulus but distension.

Some of the applications capable of affecting the moving parts tend to destroy the fibres by mechanical or chemical effects; some of them have no particular mechanical or chemical power of action.

The irritability and mobility of a part may be increased, diminished, or entirely lost.

*Custom and Habit.*

Custom is the frequent repetition of any application to the body, capable of affecting the sensible or irritable parts; or it is the repetition of any action or motion of the body. Habit is the effect of such repetition.

An application, producing a sensation, may have its power increased or diminished by custom. If the mind pays particular attention to any impression, its force and distinctness is increased. Hence arises the improvement of the eye, ear, &c. in distinguishing objects in painting, tones in music, &c. If the impressions are very strong, so as to excite great attention, their force is increased. If the impressions are not attended to, their force is diminished. Hence, after living for some time near any thing producing a great noise, the noise is scarcely heard.

The power of the will, in producing motion, may be increased by custom, and diminished by disuse. The will, in frequently producing a motion, may not only have its power increased, but it is also capable of producing that motion with greater accuracy, and by frequent attempts may acquire a power over a moving part, upon which it has naturally little or no influence. A motion may arise from a volition in consequence of custom, which was not naturally connected with it; as a man in turning a lathe does not will the motion of his hand, but that of the end of the chisel. Quere, Can a man produce two distinct motions by his will at once; or, when two distinct motions are produced, does the will produce them successively? the impression arising from one volition remaining till the mind renews it, after having produced the other, in the same manner as the impression of a flame making a circular motion, remains on the eye, so as to give an idea of a complete circle.

The power of producing two distinct motions, apparently at the same time, is greatly increased by custom, and hence arises the facility of execution acquired by custom.

The power of an idea in exciting motion may be increased or diminished by custom. An idea strongly imprest on the mind is for the most part more powerful in exciting a motion, than one weakly imprest. The power of an application in impressing an idea, may be increased or diminished by custom, as is above described, and of consequence the power of an idea in exciting motion.

Supposing the impression on the mind the same, if an idea has frequently produced a motion, its power is increased. On the contrary, if an idea has been often excited, and if the motion depending upon it has by any means been prevented, its power is diminished or lost.

The action of an application producing, diminishing, or altering the mode of contraction of a moving part, and which at the same time has no effect on the mind, may be increased or diminished by custom. If it be often applied, so as always to produce its effect, its power, or the certainty of its action, is for the most part increased.

An application of an equal apparent force does not always produce the same effect. If the same quantity of ipecacuanha be twice exhibited at the interval of several days, it may vomit at the first exhibition, and not at the second; or it may produce vomiting at the second exhibition, and not at the first.

In applying medicines, which do not act as simple stimuli, their particular effect cannot be increased by increasing the dose, they being converted into simple stimuli. Thus small doses of saccharum saturni produce costiveness, but a very large dose frequently purges. There is a maximum in the dose of all medicines, so that if they be exhibited in greater quantity their effects are lost instead of being increased.

An application frequently repeated, so as to produce its proper effect, often becomes more constant and uniform in its action, although it may become necessary that it should be applied in a greater degree: thus,

If an evacuating medicine be repeatedly exhibited, it generally requires a larger dose at the second, and some of the subsequent exhibitions, to produce the same effect as the first; but if these produce the effect, the power of the medicine is afterwards increased.

The more violent the effect of any application, the more is its power increased by repetition. If an application be made in so small a degree as not to produce any effect, or if its effects are by any means counteracted, its power is diminished or lost. The repeated application of some medicines in any circumstance diminishes their powers.

All the natural powers of action in the body are increased by frequent exertion. If two or more fibres have been accustomed to contract together, either by the action of the will, by an idea, or by stimuli; or if the contraction in one of them be produced by the will, while the other is brought into action at the same time by a stimulus, the producing of a contraction in the one by an application to it alone, will produce a contraction in the other. If they be fibres of the same muscle, and acted upon by a stimulus, this will happen after the communication with the brain by the nerves is cut off. If, after this habit is acquired, one of these fibres is made to contract frequently, while the other is prevented from contracting, the habit will be lost or destroyed. If any motion, or state of the body, be repeated at a particular period of time, it will often return at that period, although no other cause be applied but the habit acquired.

A habit may be destroyed by counteracting and preventing its effects. Two habits may be so connected, that preventing the one from taking place

may prevent the effects of the other. Custom has also a powerful influence on the mind.

*Exercise, Rest, and Sleep.*

When a moving part is brought into action by the will, an idea or stimulus, that action sometimes ceases upon removing the cause, sometimes it continues after the cause is removed. This last frequently happens in the production of diseases. But when it is necessary for the continuation of an action that its cause should be continually or repeatedly applied, the original power seems gradually to be exhausted, so that the motions for the most part become gradually weaker, and at last are not to be produced, as in the case of exercise.

There are some actions which are necessary for life, that are continued by the application of stimuli, and nevertheless do not apparently exhaust the original power; such as the action of the heart, the peristaltic motion of the intestines, &c. If these actions be increased beyond their common pitch, or beyond what can be allowed by the present strength of the system, they also exhaust the original power. Thus, a great exertion of the faculties of the mind also, exhausts its powers. Rest however restores both to the body and mind their powers of action.

In perfect sleep, both the body and mind are at rest, excepting in those particulars where an exertion is necessary to life. These exertions are in the alternate contractions of the heart and arteries, the motion of the muscles in respiration, the tone of the muscular fibres, blood-vessels, and other moving parts, the action of the lymphatics and secretory and excretory ducts of glands, the peristaltic motion of the intestines, &c. The common exertions of the body and mind, when a man is awake, exhaust to such a degree, as to require that rest which is found in sleep, to allow the original power to recruit itself.

In sleep the mind is often brought into action, sometimes from affections of its own, sometimes from affections of the body. The body also often exerts other powers besides those necessary for life. In these cases the original power is less recruited, and that in proportion to the exertion.

Although the original power may be so far exhausted as to require to be recruited by sleep, that state may nevertheless be prevented by any thing exciting great attention of the mind, by applications to the body producing uneasiness or pain, or by an increased action of any of its parts, or by any action or contraction which continues after its cause is removed.

Though rest is not complete at first, it has a tendency to become so during the progression of sleep. During which also the original power appears to be so much accumulated, as to give a disposition to action both in the mind and body, whence sleep goes off, or the general frame awakes.

A continued or strong action of one part of the body may not only exhaust the original power in that part, but also in all others. It may also exhaust the powers of the mind; *e contrario* a great exertion of the powers of the mind may exhaust those of the body.

A moderate exertion of the powers of the body and mind, whether separately or conjointly, tends to strengthen the whole system; but violent and continued exertion, and especially if not recruited by food and sleep, may weaken so as to destroy.

Man differs from all other animals in this, that while the rest have their faculties as perfect as they are ever intended to be from the first, in man they are but just sufficient for his existence; and it is left to himself to procure faculties, both of the body and mind, by proper exercise, by which he may excel all other animals in every power, inhabit the whole earth, and improve the powers of other animals for his own.

## Part III.

### *Nosology.*

Every deviation from health, or from that general order and harmony between organ and organ, function and function, which we have just noticed, constitutes a disease. It is obvious that such deviations may vary almost to infinitude, and hence that diseases may vary in their different seats and modifications to an almost infinite extent. The study of these constitutes the scope of medicine; and as the Greek term for disease is *νοσος (nosos)*, this peculiar branch of medical study has been usually denominated *nosology*.

Now in order to reduce the practice of medicine to something definite, to simplify what was perplexed, and to lay down certain general rules for a more accurate investigation of diseases, physicians in all ages have attempted to arrange these last into a systematic form or classification; the principles of which, derived from their respective durations, supposed modes of action, situations or sexes, have been so numerous, that it is impossible for us to do more than give a rapid glance at those which have excited most attention in our own times, and which appear to be the six following:

*Nosological Arrangement of Cullen.*

CLASS I. PYREXIÆ.

Order I. Febres.—Genera 6.
Order II. Phlegmasiæ.—Genera 18.
Order III. Exanthemata.—Genera 10.
Order IV. Hæmorrhagiæ.—Genera 4.
Order V. Profluvia.—Genera 2.

CLASS II. NEUROSES.

Order I. Comata.—Genera 2.
Order II. Adynamiæ.—Genera 4.
Order III. Spasmi.—Genera 17.
Order IV. Vesania.—Genera 4.

CLASS III. CACHEXIÆ.

Order I. Marcores.—Genera 2.
Order II. Intumescentiæ.—Genera 13.
Order III. Impetigines.—Genera 8.

CLASS IV. LOCALES.

Order I. Dysæsthesiæ.—Genera 9.
Order II. Dysorexiæ.—Genera 9.
Order III. Dyscinesiæ.—Genera 7.
Order IV. Apocenoses.—Genera 6.
Order V. Epischeses.—Genera 5.
Order VI. Tumores.—Genera 14.
Order VII. Ectopiæ.—Genera 3.
Order VIII. Dialyses.—Genera 7.
Total number of Genera 150.

*Nosological Arrangement of Sauvages.*

CLASS I. VITIA.

Order I. Maculæ.—Genera 6.
Order II. Efflorescentiæ.—Genera 4.
Order III. Phymata.—Genera 12.
Order IV. Excrescentiæ.—Genera 9.
Order V. Cystides.—Genera 10.
Order VI. Ectopiæ.—Genera 4.
Order VI. Ectopiæ.—Genera 17.
Order VII. Plagæ.—Genera 16.

CLASS II. FEBRES.

Order I. Continuæ.—Genera 5.
Order II. Remittentes.—Genera 3.
Order III. Intermittentes.—Genera 4.

CLASS III. PHLEGMASIÆ.

Order I. Exanthematicæ.—Genera 10.
Order II. Membranaceæ.—Genera 8.
Order III. Parenchymatosæ.—Genera 7.

CLASS IV. SPASMI.

Order I. Tonici Partiales.—Genera 6.
Order II. Tonici Generales.—Genera 2.
Order III. Clonici Partiales.—Genera 8.
Order IV. Clonici Generales.—Genera 6.

CLASS V. ANHELATIONES.

Order I. Spasmodicæ.—Genera 5.
Order II. Oppressivæ.—Genera 9.

CLASS VI. DEBILITATES.

Order I. Dysæsthesiæ.—Genera 10.
Order II. Anepithymiæ.—Genera 3.
Order III. Dyscinesiæ.—Genera 7.
Order IV. Leipopsychiæ.—Genera 4.
Order V. Comata.—Genera 7.

CLASS VII. DOLORES.

Order I. Vagi.—Genera 10.
Order II. Capitis.—Genera 6.
Order III. Pectoris.—Genera 3.
Order IV. Abdominales Interni.—Genera 8.
Order V. Externi et Artuum.—Genera 6.

CLASS VIII. VESANIÆ.

Order I. Hallucinationes.—Genera 6.
Order II. Morositates.—Genera 10.
Order III. Deliria.—Genera 5.
Order IV. Vesaniæ Anomalæ.—Genera 2.

CLASS IX. FLUXUS.

Order I. Sanguifluxus.—Genera 7.
Order II. Alvifluxus.—Genera 12.
Order III. Serifluxus.—Genera 14.
Order IV. Ærifluxus.—Genera 3.

CLASS X. CACHEXIÆ.

Order I. Macies.—Genera 4.
Order II. Intumescentiæ.—Genera 6.
Order III. Hydropes Partiales.—Genera 9.
Order IV. Tubera.—Genera 6.
Order V. Impetigines.—Genera 6.
Order VI. Icteritiæ.—Genera 4.
Order VII. Cachexiæ Anomalæ.—Genera 6.
Total number of Genera 315.

*Nosological Arrangement of Linnéus.*

CLASS I. EXANTHEMATICI.

Order I. Contagiosi.—Genera 6.
Order II. Sporadici.—Genera 3.
Order III. Solitarii.—Genera 1.

CLASS II. CRITICI.

Order I. Continentes.—Genera 4.
Order II. Intermittentes.—Genera 5.
Order III. Exacerbantes.—Genera 5.

CLASS III. PHLOGISTICI.

Order I. Membranacei.—Genera 7.
Order II. Parenchymatici.—Genera 7.
Order III. Musculosi.—Genus 1.

CLASS IV. DOLOROSI.

Order I. Intrinseci.—Genera 20.
Order II. Extrinseci.—Genera 5.

CLASS V. MENTALES.

Order I. Ideales.—Genera 7.
Order II. Imaginarii.—Genera 6.
Order III. Pathetici.—Genera 12.

CLASS VI. QUIETALES.

Order I. Defectivi.—Genera 6.
Order II. Soporosi.—Genera 10.
Order III. Privativi.—Genera 15.

CLASS VII. MOTORII.

Order I. Spastici.—Genera 10.
Order II. Agitatorii.—Genera 10.
Order II. Agitatorii.—Genera 5.

CLASS VIII. SUPPRESSORII.

Order I. Suffocatorii.—Genera 18.
Order II. Constrictorii.—Genera 8.

CLASS IX. EVACUATORII.

Order I. Capitis.—Genera 6.
Order II. Thoracis.—Genera 4.
Order III. Abdominis.—Genera 14.
Order IV. Genitalium com.—Genera 6.
Order IV. Genitalium fœm.—Genera 5.
Order V. Corporis Externi.—Genera 2.

CLASS X. DEFORMES.

Order I. Emaciantes.—Genera 5.
Order II. Tumidosi.—Genera 8.
Order III. Decolores.—Genera 5.

CLASS XI. VITIA.

Order I. Humoralia.—Genera 9.
Order II. Dialytica.—Genera 14.
Order III. Exulcerationes.—Genera 13.
Order IV. Scabies.—Genera 19.
Order V. Tumores Protuberantes.—Genera 10.
Order VI. Procidentiæ.—Genera 8.
Order VII. Deformationes.—Genera 18.
Order VIII. Maculæ.—Genera 9.
Total number of Genera 326.

*Nosological Arrangement of Vogel.*

CLASS I. FEBRES.

Order I. Intermittentes.—Genera 14.
Order II. Continuæ.—Genera 66.

CLASS II. PROFLUVIA.

Order I. Hæmorrhagiæ.—Genera 17.
Order II. Apocenoses.—Genera 28.

CLASS III. EPISCHESES.

Genera 8.

CLASS IV. DOLORES.

Genera 46.

CLASS V. SPASMI.

Genera 42.

CLASS VI. ADYNAMIÆ.

Genera 63.

CLASS VII. HYPÆRESTHESES.

Genera 19.

CLASS VIII. CACHEXIÆ.

Genera 25.

## CLASS IX. PARANOIÆ.

Genera 12.

## CLASS X. VITIA.

Order I. Inflammationes.—Genera 10.
Order II. Tumores.—Genera 65.
Order III. Ex'uberantiæ.—Genera 15.
Order IV. Pustulæ and Papulæ.—Genera 10.
Order V. Maculæ.—Genera 14.
Order VI. Dissolutiones.—Genera 39.
Order VII. Concretiones.—Genera 7.

## CLASS XI. DEFORMITATES.

Genera 50.
Total number of Genera 560.

*Nosological Arrangement of Sagar.*

## CLASS I. VITIA.

Order I. Maculæ.—Genera 5.
Order II. Efflorescentia.—Genera 10.
Order III. Phymata.—Genera 12.
Order IV. Excrescentiæ.—Genera 7.
Order V. Cystides.—Genera 10.
Order VI. Ectopiæ.—Genera 27.
Order VII. Deformitates.—Genera 6.

## CLASS II. PLAGÆ.

Order I. Solutiones.—Recentes, Cruentæ.—Genera 7.
Order II. Solutiones.—Recentes, Cruentæ, Artificiales.—Genera 4.
Order III. Solutiones.—Incruentæ.—Genera 7.
Order IV. Solutiones.—Anomalæ.—Genera 4.

## CLASS III. CACHEXIÆ.

Order I. Macies.—Genera 5.
Order II. Intumescentiæ.—Genera 7.
Order III. Hydropes.—Partiales.—Genera 8.
Order IV. Tubera.—Genera 6.
Order V. Impetigines.—Genera 6.
Order VI. Icteritiæ.—Genera 4.
Order VII. Anomale.—Genera 6.

## CLASS IV. DOLORES.

Order I. Vagi.—Genera 10.
Order II. Capitis.—Genera 6.
Order III. Pectoris.—Genera 2.
Order IV. Abdominis.—Genera 7.
Order V. Externarum.—Genera 7.

## CLASS V. FLUXUS.

Order I. Sanguifluxus.—Genera 7.
Order II. Alvifluxus.--Sanguinolenti.--Genera 4.
Order III. Alvifluxus.—Non Sanguinolenti.—Genera 9.
Order IV. Serifluxus.—Genera 13.
Order V. Ærifluxus.—Genera 3.

## CLASS VI. SUPPRESSIONES.

Order I. Egerendorum.—Genera 6.
Order II. Ingerendorum.—Genera 2.
Order III. Imi Ventris.—Genera 4.

## CLASS VII. SPASMI.

Order I. Tonici Partiales.—Genera 6.
Order II. Tonici Generales.—Genera 2.
Order III. Clonici Partiales.—Genera 9.
Order IV. Clonici Generales.—Genera 6.

## CLASS VIII. ANHELATIONES.

Order I. Spasmodicæ.—Genera 5.
Order II. Suppressivæ.—Genera 8.

## CLASS IX. DEBILITATES.

Order I. Dysæsthesiæ.—Genera 10.
Order II. Anepithymiæ.—Genera 3.
Order III. Dyscinesiæ.—Genera 7.
Order IV. Leipopsychiæ.—Genera 4.
Order V. Comata.—Genera 7.

## CLASS X. EXANTHEMATA.

Order I. Contagiosa.—Genera 6.
Order II. Non Contagiosa.—Genera 4.

## CLASS XI. PHLEGMASIÆ.

Order I. Musculosæ.—Genera 4.
Order II. Membranaceæ.—Genera 7.
Order III. Parenchymatosæ.—Genera 6.

## CLASS XII. FEBRES.

Order I. Continuæ.—Genera 5.
Order II. Remittentes.—Genera 3.
Order III. Intermittentes.—Genera 4.

## CLASS XIII. VESANIÆ.

Order I. Hallucinationes.—Genera 6.
Order II. Morositates.—Genera 11.
Order III. Deliria.—Genera 5.
Order IV. Anomalæ.—Genera 2.
Total number of Genera 351.

*Nosological Arrangement of Darwin.*

## CLASS I. DISEASES OF IRRITATION.

### ORDER I. *Increased Irritation.*

Gen. With increased actions of the sanguiferous system.—Species 5.
2. —— of the secerning system.—Species 19.
3. —— of the absorbent system.—Species 14.
4. —— of other cavities and membranes.—Species 15.

### ORDER II. *Decreased Irritation.*

1. With decreased action of the sanguiferous system.—Species 19.
2. —— of the secerning system.—Species 20.
3. —— of the absolute system.—Species 27.
4. —— of other cavities and membranes.—Species 19.
5. —— of the organs of sense.—Species 10.

### ORDER III. *Retrograde irritative Motions.*

1. Of the alimentary canal.—Species 11.
2. Of the absorbent system.—Species 11.
3. Of the sanguiferous system.—Species 3.

## CLASS II. DISEASES OF SENSATION.

### ORDER I. *Increased Sensation.*

1. With increased action of the muscles.—Species 13.
2. With the production of new vessels by internal membranes or glands with fever.—Species 19.
3. —— by external membranes or glands with fever.—Species 20.
4. —— by internal membranes or glands without fever.—Species 18.
5. —— by external membranes or glands without fever.—Species 13.
6. With fever subsequent to the production of new vessels or fluids.—Species 17.
7. With increased action of the organs of sense.—Species 10.

ORDER II. *Decreased Sensation.*

Gen. 1. With decreased action of the general system.—Species 3.

2. —— of particular organs.—Species 7.

ORDER III. *Retrograde sensitive Motions.*

1. Of the secretory ducts.—Species 3.

CLASS III. DISEASES OF VOLITION.

ORDER I. *Increased Volition.*

1. With increased action of the muscles.—Species 15.

2. —— of the organs of sense.—Species 25.

ORDER II. *Decreased Volition.*

1. With decreased action of the muscles.—Species 17.

2. —— of the organs of sense.—Species 3.

CLASS IV. DISEASES OF ASSOCIATION.

ORDER I. *Increased associate Motions.*

1. Catenated with irritative motions.—Species 8.
2. —— with sensitive motions.—Species 19.
3. —— with voluntary motions.—Species 6.
4. —— with external influences.—Species 7.

ORDER II. *Decreased associate Motions.*

1. Catenated with irritative motions.—Species 19.
2. —— with sensitive motions.—Species 14.
3. —— with voluntary motions.—Species 8.
4. —— with external influences.—Species 11.

ORDER III. *Retrograde associate Motions.*

1. Catenated with irritative motions.—Species 8.
2. —— with sensitive motions.—Species 7.
3. —— with voluntary motions.—Species 3.
4. —— with external influences.—Species 4.

Our remarks upon these different arrangements must be cursory. That of Vogel's would appear at first sight to be the fullest, as comprising not less than five hundred and sixty distinct genera of diseases; and that of Cullen's the least complete, as extending to not more than a hundred and fifty: but when it is reflected upon that nearly five parts out of six of the distinct genera of Vogel are regarded as mere species of other genera by Cullen, and arranged accordingly, the latter must at once be allowed to be equally full, and to possess a high advantage in point of simplicity. Sagar's is the most numerous next to Vogel's; and like Vogel's it is numerous not from the possession of additional matter, but extending to distinct genera, diseases of the same genus, and which ought to rank merely as separate species, or even varieties. In the general arrangement of these nosologists we perceive a considerable resemblance to that of Sauvages: their classes, though differently disposed, are nearly alike as well in name as in number; yet Sauvages' is the most simple, at the same time that it is the most comprehensive. The arrangement of Linnæus is like all his arrangements, neat and classical; perhaps the most classical of the whole of those now before us. His system is in a great measure his own: he has however more classes and genera, but fewer orders than Sauvages; and it is not always that the terms of his classes are sufficiently characteristic of the diseases that rank under them. Many of those that are disposed under the class *quicktales*, for example, are as much diseases of the mind, as several that are placed immediately under the class *mentales*; and we are afraid that the term *dolorosi*, peculiarly applied to class IV. is just as applicable to a great multitude of diseases distributed under other classes as it is to the tribe which is thus connectively arranged.

Of Dr. Cullen's table it is obvious that its chief features are due to himself alone; his classes are for the most part simple, and at the same time comprehensive; his orders are natural, and his genera ably disposed. The most objectionable of his classes is the last, or that entitled *locales*, which, like the *cryptogamia* of Linnæus's botanical system, is a mere appendix for the purpose of comprehending whatever could not conveniently be disposed under the previous heads. There is also some confusion as to a few of his orders, and we may here enumerate *profluvia* in class I., compared with *apocenoses* in class IV. since the former is only a Latin and the latter a Greek word of the same meaning, and since the diseases in the former order are only distinct genera of the latter in many instances; and some doubt as to the situation of several of his genera. Nevertheless, it is upon the whole the best division that has hitherto appeared, and is far more generally studied and lectured from than any other.

The arrangement of Dr. Darwin is more entirely his own than that of any of the nosologists; it has also the merit of being at once concise and comprehensive. But upon minute examination, and especially upon any attempt to act upon it in practice, its conciseness and comprehensiveness will be found its greatest inconveniences: for several of its classes, orders, and even genera, include diseases which can only be brought together under the peculiar theory which constitutes the basis of the arrangement; many parts of which, moreover, to say the least of them, are of very doubtful foundation. He has also enlisted into his nosology many changes in the animal body which cannot fairly be regarded as of a morbid character, as *cicatrix vulnerum*, healing of ulcers, class I. ord. i. gen. 3. *Parturitio*, parturition, class II. ord. i. gen. 1. *Risus*, laughter, III. i. 1. *Sympathia aliena*, Pity, III. i. 2. *Vita ovi*, life of an egg, IV. i. 4.

The species of this writer are for the most part the genera of other nosologists; while his genera may be compared to their division of orders, and his orders to a subdivision of classes.

The nomenclature adopted to discriminate the different genera of the arrangements now offered, though they differ occasionally, do not differ generally. It is impossible for us however to copy the general names, much less the species employed under each of these several arrangements, for this would occupy far more space than we can allot. We shall therefore select Dr. Cullen's synopsis, as the best and most approved specimen, and confine ourselves to this alone.

*Dr. Cullen's Synopsis.*

CLASS I. Pyrexiæ. A frequent pulse coming on after an horror; considerable heat; many of the functions injured; the strength of the limbs especially diminished.

ORDER I. Febres. Pyrexia without any primary local affection, following languor, lassitude, and other symptoms of debility.

Sect. I. Intermittentes. Fevers arising from the miasma of marshes; with an apyrexia, or at least a very evident remission; but the disease returns

constantly, and for the most part with a horror or trembling. There is only one paroxysm in a day.

Genus I. Tertiana. Similar paroxysms at an interval of about 48 hours, coming on most commonly at mid-day. A tertian hath either;

I. An apyrexia interposed;

1. Varying the duration of the paroxysms.

A. The tertian whose paroxysms are not extended beyond 12 hours.

B. The tertian with paroxysms extended beyond 12 hours.

2. Varying in the return of the paroxysms.

C. The tertian returning every day with unequal paroxysms alternately similar to one another.

D. The tertian returning every third day with two paroxysms on the same day.

E. The tertian returning every day, with two paroxysms on every third day, and only one on the intermediate ones.

F. The tertian returning every day, with a notable remission interposed between the odd and the even days, but a less remarkable one between the even and the odd one.

3. Varying in its symptoms.

G. The tertian accompanied with a disposition to sleep.

H. Accompanied with spasms and convulsive motions.

I. Accompanied with an efflorescence on the skin.

K. With phlegmasia.

4. Varying in being complicated with other diseases.

5. Varying as to its origin.

II. With the interposition only of a remission between the paroxysms.

Genus II. Quartana. Similar paroxysms, with an interval of about 72 hours, coming on in the afternoon.

I. With the interposition of an apyrexia.

1. Varying in the type.

A. The quartan with single paroxysms, returning every fourth day, none on the other days.

B. With two paroxysms every fourth day, and none on the other days.

C. With three paroxysms every fourth day, and none on the intermediate days.

D. Of the four days having only the third free from fever, with similar paroxysms every fourth day.

E. The quartan coming on every day, with similar paroxysms every fourth day.

2. Varying in its symptoms.

3. Varying in being complicated with other diseases.

II. With a remission only between the paroxysms.

Genus III. Quotidiana. Similar paroxysms with an interval of about 24 hours, coming on in the morning.

I. With the interposition of an apyrexia.

1. Varies in being solitary.

A. Universal.

B. Partial.

2. Complicated with other diseases.

II. With a remission only between the paroxysms.

Sect. II. Continuæ. Fevers without any intermission, and not occasioned by marsh miasmata; attended with exacerbations and remissions, though not very remarkable.

Genus IV. Synocha. Great heat; a frequent, strong, and hard pulse; high-coloured urine; the functions of the sensorium a little disturbed.

Genus V. Typhus. A contagious disease; the heat not greatly above the natural; the pulse small, weak, and for the most part frequent; the urine little changed; the functions of the sensorium very much disturbed, and the strength greatly diminished.

The species are,

I. Typhus petechialis. Typhus for the most part with petechiæ

Varying in degree. 1. Mild typhus. 2. Malignant typhus.

II. Typhus icterodes. Typhus with a yellowness of the skin.

Genus VI. Synochus. A contagious disease. A fever composed of a synocha and typhus; in the beginning a synocha, but towards the end a typhus.

Order II. Phlegmasiæ. A synocha fever, with inflammation or topical pain, the internal function of the part being at the same time injured; the blood covered with size.

Genus VII. Phlogosis. Pyrexia; redness, heat, and painful tension, of some external part.

The species are,

I. Phlogosis (phlegmone) of a vivid red colour; a swelling well defined, for the most part elevated to a point, and frequently degenerating into an abscess, with a beating or throbbing pain.

The variations are, 1. In the form. 2. In the situation.

II. Phlogosis (erythema) of a reddish colour, vanishing by pressure; of an unequal and creeping circumference, with scarce any swelling; ending in the scaling off the cuticle, in phlyctenæ, or blisters.

The variations are, 1. In the degree of violence. 2. In the remote cause. 3. In being complicated with other diseases.

The consequences of phlogosis are, an imposthume, gangrene, sphacelus.

Genus VIII. Ophthalmia. A redness and pain of the eye, with an inability to bear the light; for the most part with an effusion of tears.

The species and varieties of the ophthalmia are,

I. Idiopathic.

1. Ophthalmia (membranarum) in the tunica adnata, and the membranes lying under it, or the coats of the eye.

A. Varying in the degree of the external inflammation.

B. In the internal coats affected.

2. Ophthalmia (tarsi) of the eye-lids, with swelling, erosion, and glutinous exsudation.

II. Symptomatic.

1. From a disease of the eye itself.

2. From diseases of other parts, or of the whole body.

Genus IX. Phrenitis. Violent pyrexia; pain of the head; redness of the face and eyes; inability to endure the light or any noise; watchfulness; a fierce delirium, or typhomania.

I. Idiopathic.

II. Symptomatic.

Genus X. Cynanche. Pyrexia sometimes inclining to a syphus; difficulty of swallowing and breathing; with a sensation of narrowness in the fauces.

The species are,

I. Cynanche (tonsillaris) affecting the mucous membrane of the fauces, but especially the tonsils, with redness and swelling, accompanied with a synocha.

II. Cynanche (maligna) affecting the tonsils and mucous membrane of the fauces with swelling, redness, and mucous crusts of a whitish or ash-colour, creeping, and covering ulcers; with a typhous fever and exanthemeta.

III. Cynanche (treachealis), attended with difficult respiration, noisy and hoarse inspiration, loud cough, without any apparent tumour in the fauces, somewhat difficult deglutition, and a synocha.

IV. Cynanche (pharingæa), attended with redness in the bottom of the fauces, very difficult and painful deglutition, respiration sufficiently free, and a synocha.

V. Cynanche (parotidæa), with great swelling of the parotids and maxillary glands appearing on the outside: the respiration and deglutition but little injured; a synocha, for the most part mild.

Diseases of this genus are symptomatic, either from external or internal causes.

Genus XI. Pneumonia. Pyrexia, with a pain in some part of the thorax, difficult respiration, and cough. The species are,

I. Peripneumony, with a pulse not always hard, but sometimes soft; an obtuse pain of the breast; the respiration always difficult; sometimes the patient cannot breathe unless in an upright posture; the face swelled, and of a livid colour; the cough for the most part moist, frequently bloody.

1. Simple idiopathic peripneumonies.

Varying in degree.

2. Idiopathic peripneumonies complicated with fever.

3. Symptomatic peripneumonies.

II. Pleurisy, with a hard pulse; for the most part attended with a pungent pain of one side, augmented chiefly during the time of inspiration; an uneasiness when lying on the side; a most painful cough, dry in the beginning of the disease, afterwards moist, and frequently bloody.

1. Simple idiopathic pleurisies.

2. Pleurisies, complicated (1.) With fever. (2.) With catarrh.

3. Symptomatic pleurisies.

4. False pleurisies.

The consequences of pleurisy are a vomica or empyema.

Genus XIII. *Carditis. Pyrexia; pain about the heart; difficulty of breathing; cough; unequal pulse: palpitation of the heart, and fainting.

I. Idiopathic.

II. Symptomatic.

Genus XIV. Peritonitis. Pyrexia; pain of the belly, exasperated by an upright posture, without the proper signs of other abdominal phlegmasiæ. If the diagnostics of the following diseases are given, they may be reckoned as so many species of this genus.

I. Peritonitis (propria), situated in the peritonæum, properly so called, surrounding the inside of the abdomen.

II. Peritonitis (omentalis), in the peritonæum extended through the omentum.

III. Peritonitis (mesenterica), in the peritonæum spread through the mesentery.

Genus XV. Gastritis. Pyrexia inclining to a typhus; anxiety; pain and heat of the epigastrium, augmented when any thing is taken into the stomach; an inclination to vomit, and an immediate rejection of every thing swallowed; an hickup.

I. Idiopathic.

2. From internal causes.

A. Gastritis (phlegmonodæa), attended with acute pain and violent pyrexia.

2. From internal causes.

B. Gastritis (erysipelatosa), with a less violent fever and pain; an erysipelatous redness appearing on the fauces.

II. Symptomatic.

Genus XVI. Enteritis. Pyrexia of a typhous nature; pungent pain of the belly, stretching and twisting round the navel; vomiting; the belly obstinately bound.

I. Idiopathic.

1. Enteritis (phlegmonodæa), with acute pain, violent fever, vomiting, and constipation of the belly.

2. Enteritis (erysipelatosa), with less acute fever and pain, without vomiting; but accompanied with a diarrhœa.

II. Symptomatic.

Genus XVII. Hepatitis. Pyrexia; tension and pain of the right hypochondrium; sometimes pungent like that of a pleurisy, but more frequently obtuse; a pain reaching to the clavicle and top of the right shoulder; a difficulty of lying on the left side; dyspnœa; dry cough, vomiting, and hickup.

Genus XVIII. Splenitis. Pyrexia; tension, heat, and swelling of the left hypochondrium, the pain increasing by pressure; without the signs of nephritis.

Genus XIX. Nephritis. Pyrexia; pain in the region of the kidney, often following the course of the ureter; frequent making of water, either thin and colourless, or very red; vomiting; stupor of the thigh; with a retraction or pain of the testicle of the same side. The species are,

I. Idiopathic. Spontaneous.

II. Symptomatic.

Genus XX. Cystitis. Pyrexia; pain and swelling of the hypogastrium; frequent and painful making of water, or ischuria; and tenesmus. The species are,

I. Those arising from internal causes.

II. Those from external causes.

Genus XXI. Hysteritis. Pyrexia; heat, tension, swelling, and pain of the hypogastrium; the os uteri painful when touched; vomiting.

Genus XXII. Rheumatismus. A disease arising from an external and frequently very evident cause: pyrexia; pain about the joints, frequently pursuing the course of the muscles; infesting the knees and other large joints rather than those of the feet or hands; increased by external heat.

The species are either idiopathic or symptomatic. The former varies in situation.

A. In the muscles of the loins.

B. In the muscles of the coxendix.

C. In the muscles of the breast.

Genus XXIII. Odontalgia; a rheumatism of the jaws from a caries of the teeth.

Genus XXIV. Podagra. An hereditary disease, arising without any evident external cause, but for the most part preceded by an unusual affection of the stomach; pyrexia; pain of a joint, for the most part of the great toe of the foot, at least infesting chiefly the wrists and ankles; returning by intervals; and often alternated with affections of the stomach and other internal parts.

I. Podagra (regularis), with a pretty violent inflammation of the joints remaining for some days, and by degrees going off with swelling, itching, and desquamation of the affected part.

II. Podagra (atonica), with an atony of the stomach, or some other internal part; and either without the usual inflammation of the joints, or only with slight and wandering pains; and frequently alternated with dyspepsia, or other symptoms of atony.

III. Podagra (retrograda), with the inflammation of the joints suddenly receding, and an atony of the stomach and other parts immediately following.

IV. Podagra (aberrans), with the inflammation

of an internal part either preceding or not, and suddenly receding; with an inflammation of the joints.

Genus XXV. Arthropuosis. Deep, obtuse, and long-continued pains of the joints or muscular parts, frequently following contusions; with either no swelling, or a moderate and diffused one; no phlogosis; pyrexia, at first gentle, afterwards hectic, and at length an imposthume.

ORDER III. Exanthemata. Contagious diseases; affecting a person only once in their life; beginning with fever; after a certain time appear phlogosis, for the most part small and in inconsiderable number, and dispersed over the skin.

Genus XXVI. Erysipelas. A synocha of two or three days, for the most part attended with drowsiness, often with a delirium. In some part of the skin, most frequently the face, appears a phlogosis erythema. (G. VII. Sp. 2.) The species are,

I. Erysipelas (vesiculosum), with erythema, redness creeping, occupying a large space, and in some parts ending in large blisters.

II. Erysipelas (phlyctenodes), with an erythema formed of a number of papulæ, chiefly occupying the trunk of the body, ending in phlyctenæ or small blisters.

The disease is also symptomatic.

Genus XXVII. Pestis. An exceedingly contagious typhus, with the highest debility. On an uncertain day of the disease buboes and carbuncles break forth. It is various in degree, but the species are uncertain.

Genus XXVIII. Variola; a contagious synocha, with vomiting, and pain on pressing the epigastrium. On the third day begins, and on the fifth is finished, the eruption of inflammatory pustules, which suppurate in the space of eight days, and at last go off in crusts; frequently leaving depressed cicatrices or pockpits in the skin. The species are,

I. Variola (discreta), with few, distinct, turgid pustules, having circular bases; the fever ceasing immediately after the eruption.

II. Variola (confluens), with numerous, confluent, irregularly shaped pustules, flaccid, and little elevated; the fever remaining after the eruption.

Genus XXIX. Varicella. Synocha; papulæ breaking out after a short fever, similar to those of the small pox, but hardly ever coming to suppuration; after a few days going off in small scales, but never leaving any mark.

Genus XXX. Rubeola. A contagious synocha, with sneezing, epiphora, and dry hoarse cough. On the fourth day, or a little later, break forth small, clustered, and scarce elevated papulæ; after three days going off in very small branny scales.

I. Rubeola (vulgaris), with very small confluent, corymbose papulæ, scarce rising above the skin.

Varying,

1. In the symptoms being more severe, and the course of the disease less regular.

2. In being accompanied with a quinsey.

3. With a putrid diathesis.

II. Rubeola (variolodes), with distinct papulæ, raised above the skin.

Genus XXXI. Miliaria. Synochus with anxiety, frequent sighing, fœtid sweat, and points on the skin. On an uncertain day of the disease, break out red, small, distinct papulæ, spread over the whole body as well as the face; the apices of which, after one or two days, become very small white pustules, remaining for a short time.

Genus XXXII. Scarlatina. A contagious synocha. On the fourth day of the disease the face swells a little; at the same time an universal redness occupies the skin in large spots, at length running together; after three days going off in branny scales; frequently succeeded by an anasarca. The species are,

I. Scarlatina (simplex), not accompanied with cynanche.

II. Scarlatina (cynanchica), with an ulcerous cynanche.

Genus XXXIII. Urticaria. An amphemerina fever. On the second day of the disease, red spots resembling the stinging of nettles, almost vanishing during the day, but returning in the evening with the fever, and after a few days going off altogether in very small scales.

Genus XXXIV. Pemphigus. A contagious typhus. On the first, second, or third day of the disease, blisters break out in several parts of the body, of the bigness of a bean, remaining for many days, and at last pouring out a thin ichor.

Genus XXXV. Aphtha. Synochus; the tongue somewhat swelled and of a livid colour, as well as the fauces; eschars first appearing in the fauces, but at length occupying the whole internal part of the mouth, of a white colour, sometimes distinct, often running together; quickly growing again when taken off; and remaining for an uncertain time.

The species are, 1. Idiopathic. 2. Symptomatic.

ORDER IV. Hæmorrhagiæ. Pyrexia, with a profusion of blood, without any external violence: the blood drawn from a vein hath the same appearance as in phlegmasiæ.

Genus XXXVI. Epistaxis. Pain or weight of the head, redness of the face; a profusion of blood from the nose.

I. Idiopathic.

Varying according to the time of life.

1. Epistaxis of young people, with symptoms of an arterious plethora.

2. Epistaxis of old people, with symptoms of a venous plethora.

II. Symptomatic.

1. From internal causes.

2. From external causes.

Genus XXXVII. Hæmoptysis. Redness of the cheeks; a sensation of uneasiness, or pain, and sometimes of heat in the breast; difficulty of breathing; tickling of the fauces; either a severe or less violent cough, bringing up florid and frequently frothy blood.

The idiopathic species are,

1. Hæmoptysis (plethorica), without any external violence, and without being preceded by any cough or suppression of any customary evacuation.

2. Hæmoptysis (violenta), from external violence applied.

3. Hæmoptysis (phthisica), after a long continued cough, with a leanness and debility.

4. Hæmoptysis (calculosa), in which some calculous molecules, for the most part of a calcareous nature, are thrown up.

5. Hæmoptysis (vicaria), after the suppression of a customary evacuation.

Besides these, there are a number of symptomatic species mentioned by different authors. The consequence of an hæmoptysis is, a

Phthisis. A wasting and debility of the body, with a cough, hectic fever, and for the most part a purulent expectoration. The species are,

I. An incipient phthisis, without any expectoration of pus.

II. A confirmed phthisis, with an expectoration of pus.

Both species vary, 1. As to their remote cause. 2. As to the origin of the purulent matter.

Genus XXXVIII. Hæmorrhois. Weight and pain of the head; vertigo; pain of the loins; pain of the anus; livid painful tubercles, from which for the most part blood flows out; which sometimes also drops out of the anus, without any apparent tumor. The species are,

1. Hæmorrhois (tumens), external from mariscæ. Varying.
A. Bloody.
B. Mucous.

2. Hæmorrhois (procidens), external from a *procidentia ani.*

3. Hæmorrhois (fluens), internal, without any swelling, or *procidentia ani.*

4. Hæmorrhois (cæca), with pain and swelling of the anus, without any profusion of blood.

Genus XXXIX. Menorrhagia. Pains of the back, belly, and loins, like those of child-birth; an unusually copious flux of the menses or blood from the vagina. The species are,

1. Menorrhagia (rubra), bloody in women neither with child nor in child-birth.

2. Menorrhagia (abortus), bloody in women with child.

3. Menorrhagia (lochialis), bloody in women after delivery.

4. Menorrhagia (vitiorum), bloody from some local disease.

5. Menorrhagia (alba), serous, without any local disease, in women not with child.

6. Menorrhagia (Nabothi), serous in women with child.

Order V. Profluvia. Pyrexia, with an increased secretion, naturally not bloody,

Genus XL. Catarrhus. Pyrexia frequently contagious; an increased excretion of mucus, at least efforts to excrete it.

The species are for the most part symptomatic.
1. From cold.
2. From contagion.

Genus XLI. Dysenteria. Contagious pyrexia; frequent mucous or bloody stools, while the alvine fæces are for the most part retained; gripes; tenesmus.

Varying:
1. Accompanied with worms.
2. With the excretion of small fleshy or sebaceous bodies.
3. With an intermittent fever.
4. Without blood.
5. With miliary fever.

Class II. Neuroses. An injury of the sense and motion, without an idiopathic pyrexia or any local affection.

Order I. Comata. A diminution of voluntary motion, with sleep, or a deprivation of the senses.

Genus XLII. Apoplexia. Almost all voluntary motion diminished, with sleep more or less profound; the motion of the heart and arteries remaining.

The idiophatic species are,

1. Apoplexia (sanguinea), with symptoms of universal plethora, especially of the head.

2. Apoplexia (serosa), with a leucophlegmatia over the whole body, especially in old people.

3. Apoplexia (hydrocephalica), coming on by degrees; affecting infants, or those below the age of puberty, first with lassitude, a slight fever and pain of the head, then with slowness of the pulse, dilatation of the pupil of the eye, and drowsiness.

4. Apoplexia (atrabiliaria), taking place in those of a melancholic constitution.

5. Apoplexia (traumatica), from some external injury mechanically applied to the head.

6. Apoplexia (venenata), from powerful sedatives taken internally or applied externally.

7. Apoplexia (mentalis), from a passion of the mind.

8. Apoplexia (cataleptica), the muscles remaining contractile, by external motion of the limbs.

9. Apoplexia (suffocata), from some external suffocating power.

The apoplexia is frequently symptomatic.

1. Of an intermitting fever. 2. Continued fever. 3. Phlegmasia. 4. Exanthema. 5. Hysteria. 6. Epilepsy. 7. Podagra. 8. Worms. 9. Ischuria. 10. Scurvy.

Genus XLIII. Paralysis. Only some of the voluntary motions diminished, frequently with sleep.

The idiopathic species are,

1. Paralysis (partialis), of some particular muscles only.

2. Paralysis (hemiplegica), of one side of the body.

Varying according to the constitution of the body.

*a*, Hemiplegia in a plethoric habit.

*b*, In a leucophlegmatic habit.

3. Paralysis (paraplegica), of one half of the body taken tranversely.

4. Paralysis (venenata), from sedative powers applied either internally or externally.

A symptom either of an asthenia or palsy is,

Tremor; an alternate motion of a limb by frequent strokes and intervals.

The species are, 1. Asthenic. 2. Paralytic. 3. Convulsive.

Order II. Adynamiæ. A diminution of the involuntary motions, whether vital or natural.

Genus XLIV. Syncope; a diminution, or even a total stoppage, of the mouth of the heart for a little.

I. Idiopathic.

1. Syncope (cardiaca), returning frequently without any manifest cause, with violent palpitations of the heart during the intervals.—From a fault of the heart or neighbouring vessels.

2. Syncope (occasionalis), arising from some evident cause.—From an affection of the whole system.

II. Symptomatic; or symptoms of diseases either of the whole system, or of other parts besides the heart.

Genus XLV. Dyspepsia. Anorexia, nausea, vomiting, inflation, belching, rumination, cardialgia, gastrodynia, more or fewer of those symptoms at least concurring; for the most part with a constipation of the belly, and without any other disease either of the stomach itself or of other parts.

I. Idiopathic.
II. Symptomatic.
1. From a disease of the stomach itself.
2. From a disease of other parts, or of the whole body.

Genus XLVI. Hypochondriasis. Dyspepsia, with languor, sadness and fear without any adequate causes, in a melancholy temperament,

Genus XLVII. Chlorosis. Dyspepsia, or a de-

sire of something not used as food; a pale or discoloured complexion; the veins not well filled; a soft tumor of the whole body; asthenia; palpitation; suppression of the menses.

Order III. Spasmi. Irregular motions of the muscles or muscular fibres.

Sect. I. *In the animal functions.*

Genus XLVIII. Tetanus;—a spastic rigidity of almost the whole body.

Varying according to the remote cause, as it arises either from something internal, from cold, or from a wound. It varies likewise, from whatever cause it may arise, according to the part of the body affected.

Genus XLIX. Trismus. A spastic rigidity of the lower jaw.—The species are,

1. Trismus (nescentium), seizing infants under two months old.

2. Trismus (traumaticus), seizing people of all ages either from a wound or cold.

Genus L. Convulsio.—An irregular clonic contraction of the muscles without sleep.

I. Idiopathic.

II. Symptomatic.

Genus LI. Chorea, attacking those who have not yet arrived at puberty, most commonly within the 10th or 14th year, with convulsive motions for the most part of one side in attempting the voluntary motion of the hands and arms, resembling the gesticulations of mountebanks; in walking, rather dragging one of their feet after them than lifting it.

Genus LII. Raphania. A spastic contraction of the joints, with a convulsive agitation, and most violent periodical pain.

Genus LIII. Epilepsia. A convulsion of the muscles, with sleep.

The idiopathic species are,

1. Epilepsia (cerebralis), suddenly attacking without any manifest cause, without any sense of uneasiness preceding, excepting perhaps a slight vertigo or scotomia.

2. Epilepsia (sympathica), without any manifest cause, but preceded by the sensation of a kind of air rising from a certain part of the body towards the head.

3. Epilepsia (occasionalis), arising from a manifest irritation, and ceasing on the removal of that irritation.

Varying according to the difference of the irritating matter. And thus it may arise,

From injuries of the head; pain; worms; poison; from the repulsion of the itch; or an effusion of any other acrid humour; from crudities in the stomach; from passions of the mind; from an immoderate hemorrhagy; or from debility.

Sect. II. *In the vital functions.*

In the action of the heart.

Genus LIV. Palpitatio. A violent and irregular motion of the heart.

In the action of the lungs.

Genus LV. Asthma. A difficulty of breathing returning by intervals, with a sense of straitness in the breast, and a noisy respiration with hissing. In the beginning of the paroxysm there is either no cough at all, or coughing is difficult; but towards the end the cough becomes free, frequently with a copious spitting of mucus.—The idiopathic species are,

1. Asthma (spontaneum), without any manifest cause or other concomitant disease.

2. Asthma (exanthematicum), from the repulsion of the itch or other acrid effusion.

3. Asthma (plethoricum), from the suppression of some customary sanguineous evacuation, or from a spontaneous plethora.

Genus LVI. Dyspnœa. A continual difficulty of breathing, without any sense of straitness, but rather of fulness and infarction in the breast; a frequent cough throughout the whole course of the disease.

The idiopathic species are,

1. Dyspnœa (catarrhalis), with a frequent cough, bringing up plenty of viscid mucus.

2. Dyspnœa (sicca), with a cough for the most part dry.

3. Dyspnœa (aërea), increased by the least change of weather.

4. Dyspnœa (terrea), bringing up with the cough an earthy calculous matter.

5. Dyspnœa (aquosa), with scanty urine and œdematous feet; without any fluctuation in the breast, or other signs of an hydrothorax.

6. Dyspnœa (pinguedi nosa), in very fat people.

7. Dyspnœa (thoracica), from an injury done to the parts surrounding the thorax, or from some bad conformation of them.

8. Dyspnœa (extrinsica), from evident external causes.

The symptomatic species of dyspnœa are symptoms,

1. Of diseases of the heart or large vessels.

2. Of a swelling in the abdomen.

3. Of various diseases.

Genus LVII. Pertussis. A contagious disease; convulsive strangulating cough reiterated with noisy inspiration; frequent vomiting.

Sect. III. *In the natural functions.*

Genus LVIII. Pyrosis. A burning pain in the epigastrium, with plenty of aqueous humour, for the most part insipid, but sometimes acrid, belched up.

Genus LIX. Colica. Pain of the belly, especially twisting round the navel; vomiting; a constipation.

The idiopathic species are,

1. Colica (spasmodica), with retraction of the navel, and spasms of the abdominal muscles.

Varying, by reason of some symptoms superadded. Hence,

*a*, Colica, with vomiting of excrements, or of matters injected by the anus.

*b*, Colica, with inflammation supervening.

2. Colica (pictonum), preceded by a sense of weight or uneasiness in the belly, especially about the navel; then comes on the colic pain, at first slight and interrupted, chiefly augmented after meals: at length more severe and almost continual, with pains of the arms and back, at last ending in a palsy.

Varying according to the nature of the remote cause; and hence,

*a*, From metallic poison.

*b*, From acids taken inwardly.

*c*, From cold.

*d*, From a contusion of the back.

3. Colica (stercorea), in people subject to costiveness.

4. Colica (accidentalis), from acrid matter taken inwardly.

5. Colica (meconialis), in new-born children, from a retention of the meconium.

6. Colic (callosa), with a sensation of stricture in some part of the intestines, and frequently of a collection of flatus with some pain before the constricted part; which flatus also passing through the part where the stricture is felt, gradually vanishes;

the belly slow, and at last passing only a few liquid fæces.

7. Colica (calculosa), with a fixed hardness in some part of the abdomen, and calculi sometimes passing by the anus.

Genus LX. Cholera. A vomiting of bilious matter, and likewise a frequent excretion of the same by stool; anxiety; gripes; spasms in the calves of the legs.

I. Idiopathic.

1. Cholera (spontanea), arising in a warm season, without any manifest cause.

2. Cholera (accidentalis), from acrid matters taken inwardly.

II. Symptomatic.

Genus LXI. Diarrhœa. Frequent stools; the disease not infectious; no primary pyrexia.

I. Idiopathic.

1. Diarrhœa (crapulosa), in which the excrements are voided in greater quantity than naturally.

2. Diarrhœa (biliosa), in which yellow fæces are voided in great quantity.

3. Diarrhœa (mucosa), in which either from acrid substances taken inwardly, or from cold, especially applied to the feet, a great quantity of mucus is voided.

4. Diarrhœa (cœliaca), in which a milky humour of the nature of chyle is passed.

5. Diarrhœa (lienterio), in which the aliments are discharged with little alteration soon after eating.

6. Diarrhœa (hepatirrhæa), in which a bloody serous matter is discharged without pain.

II. Symptomatic.

Genus LXII. Diabetes. A chronical profusion of urine, for the most part preternatural, and in immoderate quantity.

I. Idiopathic.

1. Diabetes (mellitus,) with urine of the smell, colour, and taste of honey.

2. Diabetes (insipidus), with limpid, but not sweet urine.

II. Symptomatic.

Genus LXIII. Hysteria. Rumbling of the bowels; a sensation as of a globe turning itself in the belly, ascending to the stomach and fauces, and there threatening suffocation; sleep; convulsions; a great quantity of limpid urine; the mind involuntarily fickle and mutable.

The following are by Sauvages reckoned distinct idiopathic species; but, by Dr. Cullen, only varieties of the same species.

A, From a retention of the menses.

B, From a menorrhagia cruenta.

C, From a menorrhagia serosa, or fluor albus.

D, From an obstruction of the viscera.

E, From a fault of the stomach.

F, From too great salacity.

Genus LXIV. Hydrophobia. A dislike and horror at any kind of drink, as occasioning a convulsion of the pharynx; induced, for the most part, by the bite of a mad animal. The species are,

I. Hydrophobia (rabiosa), with a desire of biting the by-standers, occasioned by the bite of a mad animal.

II. Hydrophobia (simplex), without madness, or any desire of biting.

Order IV. Vesaniæ. Disorders of the judgment, without any pyrexia or coma.

Genus LXV. Amentia; an imbecility of judgment, by which people either do not perceive, or do not remember, the relations of things. The species are,

I. Amentia (congenita), continuing from a person's birth.

II. Amentia (senilis), from the diminution of the perceptions and memory through extreme old age.

III. Amentia (acquisita), occurring in people formerly of a sound mind, from evident external causes.

Genus LXVI. Melancholia; a partial madness, without dyspepsia.

Varying according to the different subjects concerning which the person raves; and thus it is,

1. With an imagination in the patient concerning his body being in a dangerous condition, from slight causes; or that his affairs are in a desperate state.

2. With an imagination concerning a prosperous state of affairs.

3. With violent love, without satyriasis or nymphomania.

4. With a superstitious fear of a future state.

5. With an aversion from motion and all the offices of life.

6. With restlessness, and an impatience of any situation whatever.

7. With a weariness of life.

8. With a deception concerning the nature of the patient's species.

Dr. Cullen thinks that there is no such disease as that called dæmonomania, and that the diseases mentioned by Sauvages under that title are either,

1. Species of melancholy or mania; or

2. Of some disease by the spectators falsely ascribed to the influence of an evil spirit; or

3. Of a disease entirely feigned; or,

4. Of a disease partly true and partly feigned.

Genus LXVII. Mania; universal madness.

1. Mania (mentalis), arising entirely from passions of the mind.

2. Mania (corporea), from an evident disease of the body.

Varying according to the different disease of the body.

3. Mania (obscura), without any passion of mind or evident disease of the body preceding.

The symptomatic species of mania are,

1. Paraphrosyne from poisons.

2. Paraphrosyne from passion.

3. Paraphrosyne febrilis.

Genus LXVIII. Oneirodynia. A violent and troublesome imagination in time of sleep.

1. Oneirodynia (activa), exciting to walking and various motions.

2. Oneirodynia (gravans), from a sense of some weight incumbent, and pressing on the breast especially.

Class III. Cachexiæ; a depraved habit of the whole or greatest part of the body, without primary pyrexia or neurosis.

Order I. Marcores. A wasting of the whole body.

Genus LXIX. Tabes. Leanness, asthenia, hectic pyrexia. The species are,

1. Tabes (purulenta), from an external or internal ulcer, or from a vomica.

Varying in its situation: hence,

2. Tabes (scrophulosa), in scrophulous constitutions.

3. Tabes (venenata), from poison taken inwardly.

Genus LXX. Atrophia. Leanness and asthenia, without hectic pyrexia. The species are,

1. Atrophia (inanitorum), from too great evacuation.

2. Atrophia (famelicorum), from a deficiency of nourishment.

3. Atrophia (cacochymica), from corrupted nourishment.

4. Atrophia (debilium), from the function of nutrition being depraved, without any extraordinary evacuation or cacochymia having preceded.

Order II. Intumescentiæ. An external tumor of the whole or greatest part of the body.

Sect. I. *Adiposæ.*

Genus LXXI. Polysarcia; a troublesome swelling of the body from fat.

Sect. II. *Flatuosæ.*

Genus LXII. Pneumatosis. A tense elastic swelling of the body, crackling under the hand. The species are,

1. Pneumatosis (spontanea), without any manifest cause.

2. Pneumatosis (traumatica), from a wound in the breast.

3. Pneumatosis (venenata), from poison injected or applied.

4. Pneumatosis (hysterica), with hysteria.

Genus LXXIII. Tympanites. A tense, elastic, sonorous swelling of the abdomen; costiveness; a decay of the other parts. The species are,

1. Tympanites (intestinalis), with a tumor of the abdomen frequently unequal, and with a frequent evacuation of air relieving the tension and pain.

2. Tympanites (abdominalis), with a more evident noise, a more equable tumor, and a less frequent emission of flatus, which also gives less relief.

Genus LXXIV. Physometra. A slight elastic swelling in the epigastrium, having the figure and situation of the uterus.

Sect. III. *Aquosæ* or *Hydropes.*

Genus LXXV. Anasarca. A soft, inelastic swelling of the whole body, or some part of it. The species are,

1. Anasarca (serosa), from a retention of serum on account of the suppression of the usual evacuations, or from an increase of the serum on account of too great a quantity of water taken inwardly.

2. Anasarca (oppilata), from a compression of the veins.

3. Anasarca (exanthematica), arising after exanthemata, especially after the erysipelas.

4. Anasarca (anæmia), from the thinness of the blood produced by hemorrhagy.

5. Anasarca (debilium), in weak people after long diseases, or from other causes.

Genus LXXVI. Hydrocephalus. A soft inelastic swelling of the head, with the sutures of the cranium opened.

Genus LXXVII. Hydrorachitis. A soft, slender tumor above the vertebræ of the loins; the vertebræ gaping from each other.

Genus LXXVIII. Hydrothorax. Dyspnœa; paleness of the face; œdematous swellings of the feet; scanty urine; lying down difficult; a sudden and spontaneous waking out of sleep, with palpitation; water fluctuating in the breast.

Genus LXXIX. Ascites. A tense, scarce elastic, but fluctuating swelling of the abdomen. The species are,

1. Ascites (abdominalis), with an equal swelling of the whole abdomen, and with a fluctuation sufficiently evident.

Varying according to the cause.

A, From an obstruction of the viscera.

B, From debility.

C, From a thinness of the blood.

2. Ascites (saccatus), with a swelling of the abdomen, in the beginning at least, partial, and with a less evident fluctuation.

Genus LXXX. Hydrometra. A swelling of the hypogastrium in women, gradually increasing, keeping the shape of the uterus, yielding to pressure, and fluctuating; without ischuria or pregnancy.

Genus LXXXI. Hydrocele. A swelling of the scrotum, not painful; increasing by degrees, soft, fluctuating, and pellucid.

Sect. IV. *Solidæ.*

Genus LXXXII. Physconia. A swelling chiefly occupying a certain part of the abdomen, gradually increasing, and neither sonorous nor fluctuating. The species are,

Physconia hepatica.
Physconia splenica.
Physconia renalis.
Physconia uterina.
Physconia ab ovario.
Physconia mesenterica.
Physconia intestinalis.
Physconia omentalis.
Physconia polysplachna.
Physconia visceralis.
Physconia externa lupialis.
Physconia externa scirrhodea.
Physconia externa hydatidosa.
Physconia ab adipe subcutaneo.
Physconia ab excrescentia.

Genus LXXXIII. Rachitis. A large head, swelling most in the forepart, the ribs depressed; abdomen swelled, with a decay of the other parts.

Varying,

1. Simple, without any other disease.

2. Joined with other diseases.

Order III. Impetigines. Cachexies chiefly deforming the skin and external parts of the body.

Genus LXXXIV. Scrophula. Swellings of the conglobate glands, especially in the neck; swelling of the upper lip and support of the nose; the face florid, skin thin, abdomen swelled. The species are,

1. Scrophula (vulgaris), simple, external, and permanent.

2. Scrophula (mesenterica), simple, internal, with paleness of the face, want of appetite, swelling of the abdomen, and unusual fetor of the excrements.

3. Scrophula (fugax), most simple, appearing only about the neck; for the most part proceeding from the resorption of the matter of ulcers in the head.

4. Scrophula (Americana), joined with the yaws.

Genus LXXXV. Syphilis. A contagious disease, after impure venery, and a disorder of the genitals; ulcers of the tonsils; of the skin, especially about the margin of the hair; corymbose papulæ, ending in crusts and crusty ulcers; pains of the bones; exostoses.

Genus LXXXVI. Scorbutus. In cold countries, attacking after putrescent diet, especially such as is salt and of the animal-kind, where no supply of fresh vegetables is to be had; asthenia; stomacace; spots of different colours on the skin, for the most part livid, and appearing chiefly among the roots of the hair.

Varying in degree,

*a*, Scorbutus insipiens.
*b*, Scorbutus crescens.
*c*, Scorbutus inveteratus.
Varying also in symptoms.
*d*, Scorbutus lividus.
*e*, Scorbutus petechialis.
*f*, Scorbutus pallidus.
*g*, Scorbutus ruber.
*h*, Scorbutus calidus.

Genus LXXXVII. Elephantiasis. A contagious disease; thick, wrinkled, rough, unctuous skin, destitute of hairs, anæsthesia in the extremities, the face deformed with pimples, the voice hoarse and nasal.

Genus LXXXVIII. Lepra. The skin rough, with white, branny, and chopped eschars, sometimes moist beneath, with itching.

Genus LXXXIX. Frambœsia. Swellings resembling fungi, or the fruit of the mulberry or raspberry, growing on various parts of the skin.

Genus XC. Trichoma. A contagious disease; the hairs thicker than usual, and twisted into inextricable knots and cords.

Genus XCI. Icterus. Yellowness of the skin and eyes; white fæces; urine of a dark red, tinging what is put into it of a clay-colour.

The idiopathic species are,

1. Icterus (calculosus), with acute pain in the epigastric region, increasing after meals; biliary concretions voided by stool.

2. Icterus (spasmodicus), without pain, after spasmodic diseases and passions of the mind.

3. Icterus (hepaticus), without pain, after diseases of the liver.

4. Icterus (gravidarum), arising during the time of pregnancy, and going off after delivery.

5. Icterus (infantum), coming on in infants a few days after birth.

Class IV. Locales. An affection of some part, but not of the whole body.

Order I. Dysethesiæ. The senses depraved, or destroyed, from a disease of the external organs.

Genus XCII. Caligo. The sight impaired or totally destroyed, on account of some opaque substance interposed between the objects and the retina, inherent in the eye itself or the eye-lids. The species are,

1. Caligo (lentis), occasioned by an opaque spot behind the pupil.

2. Caligo (corneæ), from an opacity of the cornea.

3. Caligo (pupillæ), from an obstruction of the pupil.

Varying according to the different causes from which it proceeds.

4. Caligo (humorum), from a disease or defect of the aqueous humour.

Varying according to the different state of the humour.

5. Caligo (palpebrarum), from a disease inherent in the eye-lids.

Varying according to the nature of the disease in the eye-lids.

Genus XCIII. Amaurosis. The sight diminished, or totally abolished, without any evident disease of the eye; the pupil for the most part remaining dilated and immoveable. The species are,

1. Amaurosis (compressionis), after the causes and attended with the symptoms of congestion in the brain.

Varying according to the nature of the remote cause.

2. Amaurosis (atonica), after the causes and accompanied with symptoms of debility.

3. Amaurosis (spasmodica), after the causes and with the signs of spasm.

4. Amaurosis (venenata), from poison taken into the body or applied outwardly to it.

Genus XCIV. Dysopia. A depravation of the sight, so that objects cannot be distinctly perceived, except at a certain distance, and in a certain situation. The species are,

1. Dysopia (tenebrarum), in which objects are not seen unless they be placed in a strong light.

2. Dysopia (luminis), in which objects are not distinctly seen unless by a weak light.

3. Dysopia (dissitorum), in which distant objects are not perceived.

4. Dysopia (proximorum), in which the nearest objects are not perceived.

5. Dysopia (lateralis), in which objects are not perceived unless placed in an oblique posture.

Genus XCV. Pseudoblepsis. When the sight is diseased in such a manner that the person imagines he sees things which really do not exist, or sees things which do exist after some other manner than they really are. The species are,

1. Pseudoblepsis (imaginaria), in which the person imagines he sees things which really do not exist.

Varying according to the nature of the imagination.

2. Pseudoblepsis (mutans), in which objects really existing appear somehow changed.

Varying according to the change perceived in the objects, and according to the remote cause.

Genus XCVI. Dysecœa. A diminution or total abolition of the sense of hearing. The species are,

1. Dysecœa (organica), from a disease in the organs transmitting sounds to the internal ear.

Varying according to the nature of the disease and of the part affected.

2. Dysecœa (atonica), without any evident disease of the organs transmitting the sounds.

Varying according to the nature of the cause.

Genus XCVII. Paracusis. A depravation of the hearing. The species are,

1. Paracusis (imperfecta), in which though sounds coming from external objects are heard, yet it is neither distinctly nor in the usual manner.

Varying,
*a*, With a dulness of hearing.
*b*, With a hearing too acute and sensible.
*c*, When a single external sound is doubled by some internal causes.
*d*, When the sounds which a person desires to hear are not perceived, unless some other violent sound is raised at the same time.

2. Paracusis (imaginaria), in which sounds not existing externally are excited from internal causes.

Varying according to the nature of the sound perceived, and according to the nature of the remote cause.

Genus XCVIII. Anosmia. A diminution or abolition of the sense of smell. The species are,

1. Anosmia (organica), from a disease in the membrane lining the internal parts of the nostrils.

Varying according to the nature of the disease.

2. Anosmia (atonica), without any evident disease of the membrane of the nose.

Genus XCIX. Agheustia. A diminution or abolition of the sense of taste.

1. Agheustia (organica), from a disease in the membrane of the tongue, keeping off from the nerves those substances which ought to produce taste.

2. Agheustia (atonica), without any evident disease of the tongue.

Genus C. Anæsthesia. A diminution or abolition of the sense of feeling. The species from Sauvages, adopted by Dr. Cullen, are,

1. Anæsthesia a spina bifida.
2. Anæsthesia plethorica.
3. Anæsthesia nascentium.
4. Anæsthesia melancholica.

ORDER II. Dysorexia. Error or defect in appetite.

Sect. I. *Appetitus erronei.*

Genus CI. Bulimia. A desire for food in greater quantities than can be digested.

The idiopathic species are,

1. Bulimia (helluonum), an unusual appetite for food, without any disease of the stomach.

2. Bulimia (syncopalis), a frequent desire of meat, on account of a sensation of hunger threatening syncope.

3. Bulimia (emetica), an appetite for a great quantity of meat, which is thrown up immediately after it is taken.

Genus CII. Polydipsia. An appetite for an unusual quantity of drink.

The polidypsia is almost always symptomatic, and varies only according to the nature of the disease which accompanies it.

Genus CIII. Pica. A desire of swallowing substances not used as food.

Genus CIV. Satyriasis. An unbounded desire of venery in men. The species are,

1. Satyriasis (juvenilis), an unbounded desire of venery, the body at the same time being litrle disordered.

2. Satyriasis (furiens), a vehement desire of venery, with a great disorder of the body at the same time.

Genus CV. Nymphomania. An unbounded desire of venery in women.

Varying in degree.

Genus CVI. Nostalgia. A violent desire in those who are absent from their country of revisiting it.

1. Nostalgia (simplex), without any other disease.

2. Nostalgia (complicata), accompanied with other diseases.

Sect. II. *Appetitus deficientes.*

Genus CVII. Anorexia. Want of appetite for food. Always symptomatic.

1. Anorexia (humoralis), from some humour loading the stomach.

2. Anorexia (atonica), from the tone of the fibres of the stomach being lost.

Genus CVIII. Adipsia. A want of thirst. Always a symptom of some disease affecting the sensorium commune.

Genus CIX. Anaphrodisia. Want of desire for, or impotence to, venery.

The true species are,

1. Anaphrodisia paralytica.
2. Anaphrodisia gonorrhoica.

The false ones are,

1. Anaphrodisia a mariscis.
2. Anaphrodisia ab urethræ vitio.

ORDER III. Dyscinesiæ. An impediment, or depravation of motion from a disorder of the organs.

Genus CX. Aphonia. A total suppression of voice without coma or syncope. The species are,

1. Aphonia (gutturalis), from the fauces or glottis being swelled.

2. Aphonia (trachealis), from a compression of the trachea.

3. Aphonia (atonica), from the nerves of the larynx being cut.

Genus CXI. Mutitas. A want of power to pronounce words. The species are,

1. Mutitas (organica), from the tongue being cut out or destroyed.

2. Mutitas (atonica), from the injuries done to the nerves of the tongue.

3. Mutitas (surdorum), from people being born deaf, or the hearing being destroyed during childhood.

Genus CXII. Paraphonia. A depraved sound of the voice. The species are,

1. Paraphonia (puberum), in which, about the time of puberty, the voice, from being acute and sweet, becomes more grave and harsh.

2. Paraphonia (rauca), in which, by reason of the dryness or flaccid tumor of the fauces, the voice becomes rough and hoarse.

3. Paraphonia (resonans), in which, by reason of an obstruction in the nostrils, the voice becomes hoarse, with a sound hissing through the nostrils.

4. Paraphonia (palatina), in which, on account of a defect or division of the uvula, for the most part with an hare lip, the voice becomes obscure, hoarse, and unpleasant.

5. Paraphonia (clangens), in which the voice is changed to one acute, shrill, and small.

6. Paraphonia (comatosa), in which, from a relaxation of the velum palati and glottis, a sound is produced during inspiration.

Genus CXIII. Psellismus. A defect in the articulation of words. The species are,

1. Psellismus (hæsitans), in which the words, especially the first ones of a discourse, are not easily pronounced, and not without a frequent repetition of the first syllable.

2. Psellismus (ringens), in which the sound of the letter R is always aspirated, and, as it were, doubled.

3. Psellismus (lallans), in which the sound of the letter L becomes more liquid, or is pronounced instead of R.

4. Psellismus (emolliens), in which the hard letters are changed into the softer ones, and thus the letter S is much used.

5. Psellismus (balbutiens), in which by reason of the tongue being large, or swelled, the labial letters are better heard, and often pronounced instead of others.

6. Psellismus (acheilos), in which the labial letters cannot be pronounced at all, or with difficulty.

7. Psellismus (logostomatum), in which, on account of the division of the palate, the guttural letters are less perfectly pronounced.

Genus CXIV. Strabismus. The optic axes of the eyes not converging. The species are,

1. Strabismus (habitualis), from a bad custom of using only one eye.

2. Strabismus (commodus), from the greater debility or mobility of one eye above the other; so that both eyes cannot be conveniently used.

3. Strabismus (necessarius), from a change in the situation or shape of the parts of the eye.

Genus CXV. Contractura. A long continued and rigid contraction of one or more limbs. The species are,

1. Contractura (primaria), from the muscles becoming contracted and rigid.

*a*, From the muscles becoming rigid by inflammation.

*b*, From muscles becoming rigid by spasm.

*c*, From muscles contracted by reason of their antagonists having become paralytic.

*d*, From muscles contracted by an irritating acrimony.

2. Contractura (articularis), from stiff joints.

Order IV. Apocenoses. A flux either of blood or some other humour flowing more plentifully than usual, without pyrexia, or an increased impulse of fluids.

Genus CXVI. Profusio. A flux of blood.

Genus CXVII. Ephidrosis. A preternatural evacuation of sweat.

Symptomatic ephidroses vary according to the nature of the diseases which they accompany, the different nature of the sweat itself, and sometimes the different parts of the body which sweat most.

Genus CXVIII. Epiphora. A flux of the lachrymal humour.

Genus CXIX. Ptyalismus. A flux of saliva.

Genus CXX. Enuresis. An involuntary flux of urine without pain. The species are,

1. Enuresis (atonica), after diseases injuring the sphincter of the bladder.

2. Enuresis (irritata), from a compression or irritation of the bladder.

Genus CXXI. Genorrhœa. A preternatural flux of humour from the uthera in men, with or without a desire of venery. The species are,

1. Genorrhœa (pura), in which, without any impure venery having preceded, a humour resembling pus, without dysuria or propensity to venery, flows from the urethra.

2. Genorrhœa (impura), in which, after impure venery, an humour like pus flows from the urethera with dysuria. The consequence of this is,

3. Genorrhœa (mucosa), in which, after an impure gonorrhœa, a mucous humour flows from the urethra with little or no dysuria.

4. Genorrhœa (laxorum), in which an humour for the most part pellucid, without any erection of the penis, but with a propensity to venery, flows from the urethra while the person is awake.

5. Genorrhœa (dormientium), in which the seminal liquor is thrown out, with erection and desire of venery, in those who are asleep and have lascivious dreams.

Order V. Epischeses. Suppressions of evacuation.

Genus CXXII. Obstipatio. The stools either suppressed, or slower than usual. The species are,

1. Opstipatio (debilium), in lax, weak, and for the most part dyspeptic persons.

2. Obstipatio (rigidorum), in people whose fibres are rigid, and frequently of an hypochondriac disposition.

3. Obstipatio (obstructorum), with symptoms of the colica 1st, 2d, 4th, and 7th, above-mentioned.

Genus CXXIII. Ischuria. An absolute suppression of urine. The species are,

1. Ischuria (renalis), coming after a disease of the kidneys, with pain, or troublesome sense of weight in the region of the kidneys, and without any swelling of the hypogastrium, or desire of making water.

2. Ischuria (ureterica), coming after a disease of the kidneys, with a sense of pain or uneasiness in some part of the ureter, and without any tumor of the hypogastrium, or desire of making water.

3. Ischuria (vesicalis), with a swelling of the hypogastrium, pain at the neck of the bladder, and a frequent stimulus to make water.

4. Ischuria (urethralis), with a swelling of the hypogastrium, frequent stimulus to make water, and pain in some part of the urethra.

All these species are subdivided into many varieties, according to their different causes.

Genus CXXIV. Dysuria. A painful, and somehow impeded emission of urine. The species are,

1. Dysuria (ardens), with heat of water, without any manifest disorder of the bladder.

2. Dysuria (spasmodica), from a spasm communicated from the other parts to the bladder.

3. Dysuria (compressionis), from the neighbouring parts pressing upon the bladder.

4. Dysuria (phlogistica), from an inflammation of the neighbouring parts.

5. Dysuria (irritata), with signs of a stone in the bladder.

6. Dysuria (mucosa), with a copious excretion of mucus.

Genus CXXV. Dyspermatismus. A slow, impeded, and insufficient mission of semen in the venereal act. The species are,

1. Dyspermatismus (urethralis), from disease of the urethra.

2. Dyspermatismus (nodosus), from knots on the cavernous bodies.

3. Dyspermatismus (præputialis), from too narrow an orifice of the prepuce.

4. Dyspermatismus (mucosus), from mucus infarcting the uretha.

5. Dyspermatismus (hypertonicus), from too strong an erection of the penis.

6. Dyspermatismus (epilepticus), from a spasmodic epilepsy happening during the time of coition.

7. Dyspermatismus (apractodes), from an imbecility of the parts of generation.

8. Dyspermatismus (refluus), in which there is no emission of semen, because it returns from the urethra into the bladder.

Genus CXXVI. Amenorrhœa. The menses either flowing more sparingly than usual, or not at all, at their usual time, without pregnancy. The species are,

1. Amenorrhœa (emansionis), in those arrived at puberty, in whom, after the usual time, the menses have not yet made their appearance, and many different morbid affections have taken place.

2. Amenorrhœa (suppressionis), in adults, in whom the menses which had already begun to flow are suppressed.

3. Amenorrhœa (difficilis), in which the menses flow sparingly, and with difficulty.

Order VI. Tumores. An increased magnitude of any part without phlogosis.

Genus CXXVII. Aneurisma. A soft tumor, with pulsation, above an artery.

Genus CXXVIII. Varix. A soft tumor, without pulsation, above a vein.

Genus CXXIX. Ecchymoma. A diffused, and scarce eminent, livid tumor.

Genus CXXX. Scirrhus. An hard tumor of some part, generally of a gland, without pain, and difficultly brought to suppuration.

Genus CXXXI. Cancer. A painful tumor of a scirrhous nature, and degenerating into an ill-conditioned ulcer.

Genus CXXXII. Bubo. A suppurating tumor of a conglobate gland.

Genus CXXXIII. Sarcoma. A soft swelling, without pain.

Genus CXXXIV. Verruca. A harder scabrous swelling.

Genus CXXXV. Clavus. A hard, lamellated thickness of the skin.

Genus CXXXVI. Lupia. A moveable, soft tumor below the skin, without pain.

Genus CXXXVII. Ganglion. An harder moveable swelling, adhering to a tendon.

Genus CXXXVIII. Hydatis. A cuticular vesicle filled with aqueous humour.

Genus CXXXIX. Hydarthrus. A most painful swelling of the joints, chiefly of the knee, at first scarce elevated, of the same colour with the skin, diminishing the mobility.

Genus CXL. Exostosis. A hard tumor adhering to a bone.

Order VII. Ectopiæ. Tumors occasioned by the removal of some part out of its proper situation.

Genus CXLI. Hernia. An ectopia of a soft part as yet covered with the skin and other integuments.

Genus CXLII. Prolapsus. A bare ectopia of some soft part.

Genus CXLIII. Luxatio. The removal of a bone from its place in the joints.

Order VIII. Dialyses. A solution of continuity; manifest to the sight or touch.

Genus CXLIV. Vulnus. A recent and bloody solution of the unity of some soft part by the motion of some hard body.

Genus CXLV. Ulcus. A purulent or ichorous solution of a soft part.

Genus CXLVI. Herpes. A great number of phlyctenæ or small ulcers, gathering in clusters, creeping, and obstinate.

Genus CXLVII. Tinea. Small ulcers among the roots of the hair of the head, pouring out a humour which changes to a white friable scurf.

Genus CXLVIII. Psora. Itchy pustules and little ulcers of an infectuous nature, chiefly infesting the hands.

Genus CXLIX. Fractura. Bones broken into large fragments.

Genus CL. Caries. An exulceration of a bone.

## Part IV.

### *Practice.*

This after all is the most important branch of medical science, and that to which every other branch ought to be merely subservient. The Greeks denominated it πραξις (praxis), the Latins *modus medendi*; we have preferred the English synonym as writing for general readers.

In developing the modern practice of medicine, we shall follow as nearly as our limits will allow all the preceding arrangement of Dr. Cullen, and shall endeavour to draw our instructions from the best established authorities of modern times.

### Class I.

*Pyrexiæ.*—Frequent pulse succeeded by shivering or horror; increased heat; disturbed functions; prostration of strength.

### Order I.

*Febris. Fever.*—Pyrexy independent of local affection as its cause; languor, lassitude, and other signs of debility.

This order is divided into two sections; *intermittent*, including tertians, quartans, and quotidians, with the different varieties of these distinct genera; and *continued*, which include the genera of *synocha*, or simple inflammatory fever; *typhus*, putrid, or jail fever; and *synochus*, a mixed fever, commencing like the first, and terminating like the second. The *intermittent* family are defined as follows. Fevers arising from the miasm of marshy grounds, with an evident remission, the returning fits being almost always ushered in by horror or trembling. One paroxysm only in the day. The *continued family* are defined thus: fevers without intermission, not occasioned by marsh miasm, attended with exacerbations and remissions, though not very perceptible.

The remote causes of fever are not always to be easily or accurately distinguished, and of the proximate causes we may fairly be said to know nothing, since so many different conjectures, often in direct hostility to each other, have been offered by writers of the first reputation, and the system of yesterday has so frequently fallen before that of to-day. Without entering therefore into this controverted subject, we shall proceed to an account of the general symptoms and mode of treatment.

#### *Intermittents.*

*Symptoms.*—A regular paroxysm of this fever is divided into three stages—the cold, hot, and sweating stages.

The first stage commences with yawning and stretching; there is at the same time an uneasy sense of weariness or inaptitude to motion, accompanied with some degree of debility; paleness and shrinking of the features and extremities are also observable; at this period some coldness of the extremities may be felt by another person, although the patient takes little or no notice of it; the skin, however, becomes rough, as is the case in cold weather, and is less sensible than usual; a sensation of coldness is now felt by the patient himself, which is at first referred to the back, and gradually spreads over the whole body, producing an universal shaking: after this has lasted for some time, the patient's sensation of cold still continuing, the warmth of his skin, however, to the feeling of another person, or measured by the thermometer, gradually increases; there is nausea, and frequently vomiting of a bilious matter; pains of the back, limbs, loins, and head-ach, or more commonly drowsiness, stupor, or a considerable degree of coma attend this stage; the respiration is frequent and anxious; the pulse is small, frequent, sometimes irregular, and often scarcely perceptible: the urine is almost colourless, and without cloud or sediment.

As the cold and shivering, after alternating for some time with warm flushings, gradually abate; the hot stage is ushered in by a preternatural heat, the pulse becomes full, strong, and hard, the respiration is more free, but still frequent and anxious, the paleness and shrinking of the features, together with the constriction of the skin, now disappear, and are succeeded by a general redness and turgescence; the tongue is white and dry, the thirst is considerable, the skin continues parched, the head-ach, if it was absent in the first stage, now comes on, is accompanied with throbbing of the temporal arteries, and frequently rises to delirium, and the urine is high-coloured; as the hot stage advances, the nausea and vomiting abate, and on the appearance of moisture upon the skin, they generally cease altogether. The hot stage is at length terminated by a profuse sweat, which breaks out, first about the face and breast; it gradually extends over the whole body, and terminates the paroxysm; most of the functions are restored to their natural state, the respiration becomes free, the urine deposits a lateritious sediment, the sweat gradually ceases, and with it the febrile symptoms; the patient is, however, left in a weak and wearied state: between the pa-

roxysms, the patient is more easily fatigued than usual, complains of want of appetite, and the skin is parched, or he is more liable to profuse perspiration than in health. The cold fit of this species is longer than that of the quotidian, but shorter than that of the quartan, and the whole paroxysm is shorter than that of the quotidian, but longer than that of the quartan.

The predisposing causes of intermittents are, whatever tends to debilitate the body, a warm moist, or cold damp atmosphere, particular seasons, as spring and autumn: the occasional or exciting causes are, marsh miasmata, contagion, and perhaps lunar influence.

*Prognosis.*—Mildness and regularity of the paroxysm, a general cutaneous eruption, or an eruption about the mouth and behind the ears, accompanied with a swelling of the upper lip, when the paroxysm is going off: a free hæmorrhage from the nose during the paroxysm, and the urine depositing a lateritious sediment in the last stage, are favourable symptoms. Coma, delirium, great anxiety, difficult respiration, attended with hickup, swelling of the tonsils, the abdomen tumid, hard, and painful to the touch, accompanied with obstinate costiveness, tension and pain in the epigastric and hypochondric regions during the paroxysm; listlessness, nausea, or debility, attended with vertigo in the intermissions, or a few drops of blood falling from the nose in the paroxysm, are unfavourable symptoms. Intermittents are frequently followed by or attended with obstructions in the different viscera, particularly in the liver and spleen; dropsy, dysentery, jaundice, and various species of inflammation.

*Treatment.*—In the paroxysms we are to endeavour to shorten the different stages, and obtain a final solution of the disease. In the intermissions we are to prevent the recurrence of the paroxysms, and endeavour to obviate certain circumstances, which may prevent the fulfilling of either of the two first indications.

The first indication will be accomplished by the administration of an emetic at the commencement of the paroxysm, or during the cold stage; for which purpose the tartar emetic is the best: it should be given in divided, but pretty large drops; the patient should at the same time be put to bed, kept in warm blankets, and allowed warm diluent, but not stimulating liquors, except there is a considerable degree of debility; and immediately the hot stage is formed a gentle diaphoresis will be excited, and a final solution of the paroxysm procured, by the exhibition of opiates, assisted by moderate draughts of tepid, or, if the heat be preternaturally great, of cold liquids, and by the neutral salts. In the intermissions, the bark should be administered in doses of a drachm or more, every one, two, or three hours, so that an ounce, or an ounce and a half, may be taken during the intermission; when the apyrexy is long, as in the tertian, its exhibition may be delayed till within six or eight hours of the time when the next paroxysm is expected, which will frequently more effectually prevent its return than when given in small doses during a long intermission; but if there is a great degree of debility, or where the intermissions are short, as in the quotidian, the cinchona should be employed immediately after the termination of the paroxysm, at longer or shorter intervals, until the return of the next fit, in such doses as the stomach will bear, and the urgency of the case may require: when this invaluable medicine purges, a few drops of the tincture of opium may be added; and if, on the other hand, it induces costiveness, a few grains of the rhubarb will obviate it, and at the same time give tone to the stomach and bowels; it is sometimes of service to add about a scruple of snake-root to each dose of the bark; where the stomach is habitually weak, it will be advisable to combine aromatics or bitters with the bark, as calamus, or canella alba, &c. The sulphat of copper may be employed in their usual doses: the oxyd of arsenic combined with opiates, either in solution or in the form of pills, will frequently succeed, when the bark and other remedies have been tried without effect. If the disease should prove obstinate, and any pain can be perceived by the patient upon pressing the right hypochondrium, small doses of the calomel or friction with the unguentum hydrargyri, continued until a slight soreness of the mouth is induced, will, in general, be attended with the most beneficial effects, as its continuance is most commonly the consequence of obstructed viscera. The circumstances which prevent our fulfilling the two first indications are, inflammatory diathesis, accumulation of bile in the stomach, and of that and fæces in the intestinal canal. The first circumstance will be removed by blood-letting; and if, during the paroxysm, any urgent symptoms indicate the presence of that diathesis, it will be attended with the greatest prospect of success, if the operation is performed during the hot stage, when the excitement is most considerable: the latter causes will be removed by the administration of emetics and cathartics: if there is a great degree of debility, the system must be strengthened by a generous diet, the moderate use of wine, gentle exercise, the cold bath, and change of air. As in this disease relapses very frequently occur, it will not only be advisable, but necessary to continue the use of the bark, in doses of a drachm four times a day, for two or three weeks; at the same time the patient must most studiously avoid all the exciting causes, and every irregularity in diet. Vernal are less liable than autumnal intermittents to become continued fevers, and are rarely attended with alarming symptoms, or followed by dangerous obstructions. The taste of the bark will be concealed in a great measure, by exhibiting it in milk, butter-milk, or infusion of liquorice; and if the stomach should possess a considerable degree of irritability, opium, administered either by itself or combined with camphor, will, in general, succeed in enabling that organ to retain the bark. The paroxysm may be generally prevented by administering a full dose of the tinctura opii, in mulled wine or hot diluted spirits, about an hour previous to its expected return.

*Continued Fever.*

This is either inflammatory (*synocha*), putrid or jail (*typhus*), or mixed (*synochus*).

*Symptoms of Synocha.*—This fever, which, however, without topical inflammation, is in this country a very rare occurrence, generally commences with short fits of cold and heat alternating with each other, to which succeed an intense burning heat, head-ach, accompanied with throbbing of the temples, or *tinnitus aurium*, pains in the back, loins, and joints, and the patient feels as if his body had been severely bruised; the face is full and florid, the eyes are inflamed and incapable of bearing the light, the skin, mouth, and throat are dry, the tongue is covered with a white crust, the thirst is intolerable, the respiration is frequent, hurried, generally oppressed, and attended with a dry cough; there is *anorexia*, *nausea*, vomiting,

restlessness, and delirium; the urine is secreted in small quantity, and is high coloured, the bowels are costive, the pulse is frequent, strong, and hard, scarcely ever, however, exceeding one hundred and twenty strokes in a minute; the blood, when drawn, is covered with a whitish or yellowish crust. In this country, after the symptoms have continued for some days, they begin generally to assume those of typhus, so that the whole disease is synochus.

*Causes.*—Suppression of the accustomed evacuations; cold by any means applied, as exposure of the body to the cold air, when it is in a state of perspiration; exposure to the rays of the sun; intemperance in eating, but more particularly in drinking; topical inflammation; intense study; great fatigue; the premature repulsion of eruptions; perspiration suddenly checked, and violent passions of the mind.

*Diagnosis.*—This fever will be readily distinguished from the typhus mitior by the strength of the pulse, the intense heat, great thirst, violent pains in the back and joints, high coloured urine, and by the less derangement of the mental functions.

*Prognosis.*—This fever frequently terminates in a favourable manner about the seventh day, either by hemorrhage, a profuse diaphoresis, or by the urine depositing a copious lateritious sediment; the termination by diarrhœa is a much more rare occurrence. If the respiration is very laborious, if the head-ach is very severe, attended with delirium ferox, if the abdominal viscera are much affected, if the urine is pale or limpid, and the skin assumes a yellow tinge before the seventh day, we may generally expect an unfavourable issue.

The removal of this disease must be attempted by blood-letting, in proportion to the violence of the symptoms of increased excitement, strength, and former habits of life of the patient, and nature of the prevailing epidemic; if, on the first blood-letting, the symptoms are considerably alleviated, and the pulse and heat become nearly natural, it will not be necessary to repeat it; if, on the contrary, the symptoms continue with but little or no abatement, it will be not only be advisable but indispensably necessary to repeat the operation, until we nearly reduce the pulse and heat to the natural standard; the blood-letting will be the more efficacious the more suddenly we abstract the blood: an emetic should then be administered, and in a few hours after its operation has ceased, a cathartic should be exhibited, for which purpose, the phosphat or sulphat of soda, or the sulphat of magnesia combined with the infusion of senna, with a small proportion of the tartarised antimony, will be the most efficacious; the calomel is a preferable medicine to the others; after the contents of the primæ viæ are sufficiently evacuated, we should order the neutral salts, particularly the saline draughts, every two or three hours, to each dose of which, from twenty to thirty drops of antimonial wine, with the same quantity of the spirit of nitre, may be conjoined with advantage; cooling mucilaginous liquors acidulated with the vegetable acids, or cold water, should be freely allowed, when the heat of the surface of the body is steadily above the natural standard. It is of the utmost consequence, throughout the whole course of this disease, that the alimentary canal should be kept clear of feculent matter; for which purpose the mildest laxatives should be employed, or perhaps mucilaginous clysters would be preferable: all exercise, both of the body and mind, must be studiously avoided, the patient must be kept quiet and in a horizontal posture, the light should be as much as possible excluded, there should be a free circulation of cool air through the apartment, the floor of which should be frequently sprinkled with cold water, the patient should be lightly covered with bed-clothes, all excremental matters should be speedily removed, and the patient should have frequent changes of dry linen. If the pain of the head is very violent, accompanied with delirium, or if the patient is oppressed with coma, blood-letting, both general and topical, will be necessary, provided the strength of the patient is not too much exhausted, cathartics and laxative clysters must be ordered, the head should be shaved, and cooling applications, as vinegar and water, or a solution of the volatile salts of hartshorn in vinegar, and the like, must be employed; blistering the head, and fomenting the lower extremities, will also be of service. If the respiration should be much oppressed, and attended with a short dry cough, we must immediately have recourse to blood-letting, both general and local; blisters should be applied to the thorax, and we should direct a liberal use of mucilaginous diluents. Should the abdominal viscera be attacked in the course of the disease, the same general means of blood-letting and blistering must be employed, together with laxatives or fomentation of the lower extremities. In this climate, after a short period, the symptoms generally begin to assume the typhoid form, therefore some degree of caution will be indispensably necessary in the liberal employment of evacuations, lest we should induce a degree of fatal debility.

*Symptoms of Typhus.*—An uneasy and peculiar sensation in the stomach, sometimes attended with nausea and giddiness, frequently denotes the approach of this fever; in many cases, however, it is scarcely or not at all perceived, and the disease generally commences with lassitude, languor, some degree of debility, horripilatio or sense of creeping, impaired appetite, alternate and irregular heats and chills, anxiety about the præcordia, and great dejection of spirits, accompanied with frequent sighing. After these symptoms have continued for a few days, the patient is attacked with head-ach, or an uneasiness and confusion of head; a deep-seated pain, or a sensation of coldness is perceived, particularly in the occiput; there is nausea, vomiting of insipid phlegm, and great prostration of strength; the heat of the body is but little increased; there is little or no thirst; the tongue at the commencement of the disease is moist and covered with a white crust, in the more advanced stages it becomes dry, brown, and chapped; the countenance is pale and sunk; the pulse is small, weak, and frequent; the respiration is oppressed, and attended with great anxiety about the præcordia; the urine is pale, and secreted in too great a quantity. The uneasiness and confusion of head increase with the debility, and prevent the patient from going to sleep; or, if he does, it does not refresh him; and on the second or third night, some degree of delirium comes on, which, however, goes off in the morning, and returns in a more severe manner every evening; and during the day he lies in a confused state, or is constantly muttering to himself. All these symptoms go on gradually increasing, followed by tremor of the hands and tongue, muscæ volitantes, picking of the bed-clothes, subsultus tendinum, and convulsions, which generally close the scene.

*Causes.*—The depressing passions of fear, grief, and despair; all excessive evacuations; a relaxed

habit of body; immoderate venery; a sedentary and studious life; intemperance in eating and drinking; fatigue; the abstraction of the usual quantity of nourishing food; contagion, and paucity of blood.

*Diagnosis.*—The slow and insidious appearance of this fever will distinguish it from the typhus gravior: the rigors are less severe; there is a considerably less degree of heat and thirst, and no bilious vomiting; there is also greater mildness in the symptoms, even in the first stage; the skin is pale, and has a bluish and sunk appearance.

*Prognosis.*—The favourable symptoms are, an universal warm moisture of the skin; the tongue from being dry and foul becoming moist; the pulse being rendered more slow and full after a gentle diaphoresis, or the exhibition of cordials; the appearance of an eruption about the lips and nostrils; a miliary eruption, neither preceded by, nor accompanied with, profuse sweating; deafness; a temporary insanity; an increased secretion of saliva without aphthæ; a spontaneous, but gentle diarrhœa. The unfavourable symptoms are, a great degree of muscular debility; the early appearance and obstinate continuance of delirium; stupidity and listlessness of the eyes on the first days of the disease; a morbid sensibility of the surface, and of all the organs of sense; profuse evacuations, attended with a weak pulse; tremor of the hands and tongue; floccorum collectio; a considerable degree of sighing, mumbling, and moaning; constant watchfulness; coma, accompanied with fulness of the vessels of the tunica adnata, and dilated pupils; a difficulty of swallowing, attended with hickup; an unconscious discharge of the urine and fæces. Dr. Fordyce observes, in his Third Essay on Fevers, page 111, that, if the respiration and deglutition be free, the prognosis is seldom bad, although the disease may be attended with alarming symptoms.

*Treatment.*—The first step to be taken in this, as well as in most other febrile diseases, is to clear the primæ viæ of their crude and acrid contents, by the early exhibition of an emetic, which, by the concussion it gives to the whole system, dissolves the morbid catenation, and frequently terminates the disease; in a few hours after that has ceased to operate, a cathartic of the calomel should be administered, mixed with a small quantity of conserve, honey, or mucilage, and it should be allowed to remain for a short time about the fauces, before it is swallowed; throughout the whole course of the disease, we must procure the regular expulsion of the fæces, by means of the mildest laxatives, or by the injection of clysters every evening; the skin on every part of the body successively should be washed with cold water, or vinegar and water; wine and opium should be administered in small quantities, and repeated every three hours alternately; the application of small repeated blisters will be of considerable service; the administration of oxygen gass will also prove an useful auxiliary. The symptoms which forbid the use of bark are a hot and dry skin, and a parched tongue; it must therefore be our object of practice to remove those symptoms as early as possible, which will in general be accomplished by the administration of the saline draughts in a state of effervescence, every two, three, or four hours, combined with the infusion or tincture of snake-root, with from twenty to thirty drops of the æther in each draught; warm pediluvia should be ordered in the evenings, or the lower extremities should be fomented; whenever a general relaxation of the skin occurs, the bark combined with a small portion of the opiate confectio, and a few drops of the muriatic or sulphuric acid in each dose, should be given frequently, taking care at the same time not to oppress the stomach. A table-spoonful of yeast, either diluted, or in its pure state, has been of late much employed, and with a considerable degree of success; it should be given at least three or four times in the course of the day. At bed-time it will be proper to give an opiate, particularly if the patient is restless, and its effects will be promoted by combining it with about ten grains of the castor or camphor, or from fifteen to twenty grains of the compound powder of ipecacuanha, or a drachm of Hoffman's æther may be substituted; the last of which medicines, if it does not procure sleep, it does not, however, increase the heat or restlessness; if the hands and feet are at that time parched, the effects of the opium or other remedies will be promoted by moistening them with cold or tepid vinegar. If the head-ach is very distressing, blisters should be applied to the temples: should subsultus tendinum supervene, either æther, camphor, carbonat of ammonia, castor, or the musk, should be administered in large doses alternately with bark: the diet should be light and nourishing; bottled porter and wine should be allowed liberally, taking particular care that not the smallest degree of intoxication ensues: sedative and antispasmodic remedies may also be employed externally by means of friction; they have in many instances produced the most happy effects.

Dr. Currie, in his ingenious and valuable work, entitled Medical Reports on the Effects of Water, in Fevers and other Diseases, vol. i. p. 17, et seq. observes, when speaking of the aspersion or affusion of cold water, vinegar and water, or of a saturated brine, that the safest and most advantageous time for using either the aspersion or affusion (the latter of which he prefers), is when the exacerbation is at its height, which is marked by increased flushing, thirst, and restlessness, or immediately after its declination is begun; and this has led me always to direct it to be employed from six to nine o'clock in the evening; but it may be safely used at any time of the day, when there is no sense of chilliness present, when the heat of the surface is steadily above what is natural, and when there is no general or profuse sensible perspiration. It is at the same time highly necessary to attend to the precautions which the employment of this valuable remedy requires: 1. If the affusion of cold water on the surface of the body be used during the cold stage of the paroxysm of fever, the respiration is nearly suspended, the pulse becomes fluttering, feeble, and of an incalculable frequency; the surface and extremities become doubly cold and shrivelled, and the patient seems to struggle with the pangs of instant dissolution. I have no doubt from what I have observed, that in such circumstances the repeated affusion of a few buckets of cold water would extinguish life. This remedy should therefore never be used when any considerable sense of chilliness is present, even though the thermometer, applied to the trunk of the body, should indicate a degree of heat greater than usual. 2. Neither ought it to be used, when the heat, measured by the thermometer, is less than, or even only equal to the natural heat, though the patient should feel no degree of chilliness. This is sometimes the case towards the last stages of fever, when the powers of life are too weak to sustain so powerful a stimulus. 3. It is also necessary to abstain from the use of this remedy, when the body is under profuse sensible perspiration; and this cau-

tion is more important in proportion to the continuance of this perspiration. In the commencement of sweating, especially if it has been brought on by violent exercise, the affusion of cold water on the naked body, or even immersion in the cold bath, may be hazarded with little risk, and sometimes may be resorted to with great benefit. After the sweating has continued some time and flowed freely, especially if the body has remained at rest, either the affusion or immersion is attended with danger, even though the heat of the body at the moment of using it be greater than natural. Sweating is always a cooling process in itself, but in bed it is often prolonged by artificial means, and the body is prevented from cooling under it to the natural degree, by the load of heated clothes. When the heat has been thus artificially kept up, a practitioner judging by the information of his thermometer only may be led into error. In this situation, however, I have observed, that the heat sinks rapidly on the exposure of the surface of the body even to the external air, and that the application of cold water, either by affusion or immersion, is accompanied by a loss of heat and a deficiency of re-action, which are altogether inconsistent with safety. Under these restrictions the cold affusion may be used at any period of fever, but its effects will be more salutary in proportion as it is used more early. When employed in the advanced stages of fever, where the heat is reduced and the debility great, some cordial should be given immediately after it, and the best is warm wine. Dr. Currie, when speaking of the internal use of cold water, vol. i. p. 92. et seq. directs that, "1. Cold water is not to be used as a drink in the cold stage of the paroxysm of fever, however urgent the thirst. Taken at such times, it increases the chilliness and torpor of the surface and extremities, and produces a sense of coldness in the stomach, augments the oppression on the præcordia, and renders the pulse more frequent and more feeble. 2. When the hot stage is fairly formed, and the surface is dry and burning, cold water may be drunk with the utmost freedom. Frequent draughts of cold liquids at this period are highly grateful; they generally diminish the heat of the surface several degrees, and they lessen the frequency of the pulse. When they are attended with these salutary effects, sensible perspiration and sleep commonly follow. Throughout the hot stage of the paroxysm cold water may be safely drunk, and more freely in proportion as the heat is farther advanced above the natural standard. It may even be drunk in the beginning of the sweating stage, though more sparingly. Its cautious use at this time will promote the flow of the sensible perspiration, which, after it has commenced, seems often to be retarded by a fresh increase of animal heat. A draught of cold water taken under such circumstances will often reduce the heat to the standard at which perspiration flows more freely, and thus bring the paroxysm to a speedier issue. 3. But, after the sensible perspiration has become general and profuse, the use of cold drink is strictly to be forbidden. At this time I have perceived, in more than one instance, an inconsiderate draught of cold water produce a sudden chilliness both on the surface and at the stomach, with great sense of debility, and much oppression and irregularity of respiration. At such times, on applying the thermometer to the surface, the heat has been found suddenly and greatly reduced. The proper remedy is, to apply a bladder filled with water heated, from 110°, to 120°, to the pit of the stomach, and to administer small and repeated doses of laudanum.

Dr. Cullen divides this disease into two varieties: *typhus mitior*, or low nervous fever, being that we have now described; and *typhus gravior*, jail, camp, or hospital fever; far more violent in its symptoms, rapid in its progress, infectious in its effluvium, and fatal in its tendency. It becomes the medical practitioner, therefore, to be proportionably more bold and active, with which general observation, the same mode of treatment may for the most part be pursued. The stimulant plan must be pushed to a much greater extent, and affusions of cold water are here of more use than in the preceding variety, and of course ought to be employed with the most liberal and unhesitating attention.

*Symptoms of Synochus.*—This, as we have already observed, is a fever compounded of those that characterise the first stage of synocha or inflammatory fever, with which it commences, and of those which constitute the middle and last stages of typhus or putrid fever, into which it becomes converted by a sudden and oftentimes a very unexpected change. It is a common fever in the large manufacturing towns of this country; and great care is necessary on its first appearance, that it be not mistaken for, and consequently treated as an inflammatory attack by venesection, and a strict debilitating plan. This is the general caution on its commencement, or while we are in doubt; in its farther advance, the treatment must be adapted to the different symptoms it exhibits, as more nearly approaching to the nature of the synocha or typhus, and should be governed by the regulations already laid down for the treatment of these diseases.

Under this genus Dr. Cullen has ranged *hectic fever*; whilst he makes *phthisis*, of which he admits it to be only a symptom, under a genus of another order, which he denominotes *hæmorrhagiæ*. It cannot therefore be considered as entitled to any notice in the present place, and we shall consequently transfer it to that to which it more properly belongs.

### Order II.

*Phlegmaticæ. Inflammations.*—Topical inflammations or phlegmatiæ are a very numerous assemblage of diseases: their chief characteristics are the general symptoms of fever, and a topical inflammation attended with the lesion of some important function; in which usually, upon blood-letting, the blood is found upon coagulation to be covered with a buffy coat. This order comprehends the following eighteen genera.—1. Phlogosis, of which upon the Cullenian system there are two species; P. phlegmon, and P. erythema, or cutaneous erysipelas. 2. Ophthalmia, inflammation of the eyes. 3. Phrenitis, inflammation of the brain. 4. Cynanche, sore throat or quinsy. 5. Pneumonia, inflammation of the lungs. 6. Carditis, of the heart. 7. Peritonitis, of the peritonæum. 8. Gastritis, of the stomach. 9. Enteritis, of the intestinal canal. 10. Hepatitis, of the liver. 11. Splenitis, of the spleen. 12. Nephritis, of the kidnies. 13. Cystitis, of the urinary bladder. 14. Hysteritis, of the womb. 15. Rheumatismus, rheumatism. 16. Odontalgia, inflammatory tooth-ach. 17. Podagra, gout. 18. Asthropuosis, inflammation of the hip.

By far the greater number of these are of the same natural family, and require the same mode of treatment; and several we have already noticed in the article Dietetics. Whatever be the organ affected, with the very few exceptions we shall

presently point out, the inflammation must be attacked with applications both general and topical, and powerful in proportion to the degree of inflammation: venesection, cathartics of calomel, and laxative injections may be safely recommended as a part of the general practice; local bleeding by cupping, wherever it can be employed, and where it cannot, by leeches, should constitute an essential feature of the plan, and be repeated according to the urgency of the symptoms. In most of these diseases benefit may also be obtained by frigid lotions, as of common spring-water, ice-water, vinegar; while the general symptomatic fever, if considerable, must be attacked by the process of cure already laid down in the treatment of fevers, and varied according to the phænomena that arise. Where the cause is obvious, as in many cases of ophthalmia, or inflammation of the intestines, we should be indefatigable till it be removed, since without the accomplishment of this point every thing else must be of no avail. These are general hints: yet several of the diseases arranged under this order are connected artificially alone, and not naturally, and require a distinct treatment. We shall briefly notice a few of them.

*Erytheme.* As in this affection, notwithstanding the inflammatory appearance, there is frequently a considerable degree of debility, we must not push the antiphlogistic measures too far, particularly in debilitated habits, and in those advanced in life, for fear of inducing gangrene, but rather trust to wine, bark, combined with snake-root or camphor, and the sulphuric acid, together with local applications. Should there, notwithstanding all our efforts, be a tendency to gangrene, stimulate in a still higher degree: on the other hand, should there be any considerable danger of excitement, which, however, is rarely the case, accompanied with a hard, full, and strong pulse, blood-letting, repeated according to the violence of the symptoms and effects produced, will be necessary; at the same time it will be advisable to employ gentle cathartics: but the bark will usually be found the most efficacious remedy in every stage of this disease.

*Cynanche.*—Quinsy. Of this genius the Cullenian system makes five species. 1. C. tonsillaris. Common inflammatory sore-throat. 2. C. maligna. Malignant sore-throat, chiefly symptomatic of scarlet and other fevers of a putrid tendency. 3. C. trachealis. Croup; a disease most commonly of infancy. 4. C. pharyngea, a mere variety of C. tonsillaris, by its being extended to the pharynx. 5. C. parotidæa. Mumps: generally a slight inflammatory affection, and lasting only a few days, of the parotid and maxillary glands: though sometimes succeeded in men by symptomatic intumescence of the testes, and in women induration of the mammæ, usually, however, yielding to repellent applications and gentle aperients. If the head be affected by stupor or delirium from a similar sympathy, it should be bathed with warm water, and a few ounces of blood, according to the strength of the patient, should be taken from the arm.

Generally speaking, indeed, the common means employed in the removal of other local inflammations with the use of acid gargles is the plan to be adopted in cynanche. Yet the two following species require to be noticed separately.

C. *Trachealis.*—This disease very rarely attacks infants until after they have been weaned; it generally commences with a sensation of uneasiness, or somewhat of an obtuse pain about the upper part of the trachea, which is increased on pressure, or a sense of constriction is perceived in the neighbourhood of the larynx: upon inspecting the fauces, little or no tumor is generally observed; sometimes, however, there is some trifling degree of redness; a hoarseness and particular ringing shrill sound of the voice accompanies both speaking and coughing; the noise appears to proceed as from a brazen tube, and has been, not inaptly, compared to the crowing of a cock; there is dyspnœa, attended with a wheezing sound in the act of inspiration; the cough which attends the disease is commonly dry and short; if any thing is expectorated, it is puriform, and mixed with small portions of a whitish membrane, similar to what is found in the trachea upon dissection, which is, by that illustrious anatomist and physician, Dr. Baillie, supposed to be formed by some peculiar action of the blood-vessels of the inner surface of the larynx and the trachea, which is superadded to inflammation; the face is somewhat livid, or is flushed. With these symptoms, there is some degree of frequency and hardness of the pulse, great thirst, restlessness, and an unpleasant sense of heat; the deglutition is but little or not at all affected; the urine, at the commencement of the disease, is generally high-coloured, sometimes, however, it is limpid, but in the advanced stage it is turbid; there is seldom any delirium; sometimes, however, the patient seems stupid and mutters to himself; and often, in the perfect use of his senses, he is seized with great difficulty of breathing, and a sense of strangling about the fauces, and is suddenly carried off. This disease chiefly appears in the winter and spring; it generally attacks the most robust and ruddy children, and frequently comes on with the ordinary symptoms of catarrh.

The remotest causes are cold, combined with a moist state of the atmosphere; infancy; exposure to air passing over large bodies of water, and many of the causes producing the phlegmasiæ, and the other species of cynanche: this disease is said to be most frequently met with in marshy situations, and near the coast. The proximate cause appears to consist in an inflammation of the inner coat of the trachea and the larynx, together with an altered and peculiar action in the blood-vessels of the parts; and the adventitious membrane is the consequence.

*Treatment.*—We must attempt the cure of this disease by the remedies which are recommended for the removal of inflammation; blood-letting, both general and topical, must be immediately had recourse to, and it must be repeated according to the strength of the patient, violence of the symptoms, state of the pulse, and the effects produced from it: repeated emetics should be administered, and mild cathartics or laxative clysters should be at the same time employed; blisters should be applied to the external fauces, or stimulating liniments, as the liniment of ammonia with oil of amber and tincture of cantharidis should be made use of; the warm bath should be ordered, and the vapour of warm water with or without a portion of vinegar should be frequently received into the fauces; in every stage of the disease, the antiphologistic regimen is peculiary necessary, and the patient should lie with his head raised high in bed: small repeated doses of the calomel have been administered with the best effects, at the commencement and throughout the whole course of the disease, as two or three grains two or three times in the course of the day. This disease sometime attacks adults, in which case the most powerful remedies against inflammation, together with

the employment of emetics, must be immediately had recourse to, and persevered in with assiduity. There appear to be two varieties of this complaint; the one just now described, which may be termed the inflammatory, and the spasmodic; which, from their different requisite mode of treatment, it will be necessary to discriminate. The inflammatory cynanche commonly attacks the patient in a gradual manner, and is generally preceded for a few days by slight symptoms of pyrexy: it never, when completely formed, intermits so as to lose its distinguishing mark, particularly in coughing; the heat, frequency of the pulse, and other symptoms of pyrexy are in a much greater degree in this than in the spasmodic species. The spasmodic cynanche always attacks the patient in a sudden manner, and usually in the night-time; it often intermits, and in the intervals both the respiration and cough, if any exists, are free from the characteristic sound of the above disease; it must of course be treated with antispasmodics, as the musk, camphor, asafœtida, the warm bath, and similar remedies.

*C. Maligna.* Malignant or putrid sore throat. This disease, whether primary or symptomatic, is marked by frequent cold shiverings, alternating with fits of heat, giddiness, lassitude, anxiety, depression of spirits, nausea, and vomiting: these symptoms seldom continue long before the patient complains of a sense of stiffness in the neck, some uneasiness in the internal fauces, and hoarseness; the internal fauces, when viewed, appear of a dark red colour, are but little or not at all swollen, and deglutition is seldom attended with difficulty or pain. In a short time, a number of white, ash-coloured, or brown spots make their appearance upon the inflamed parts; these spread, run together, and cover the greatest part of the fauces with thick sloughs, which, upon falling off, discover deep ulcerations: as the disease advances, these symptoms are generally attended with a coryza, which pours out a thin, acrid, and fetid matter, which excoriates the nostrils, lips, and sometimes every part it touches: in infants diarrhœa is a more frequent occurrence than in adults, and the thin acrid matter evacuated excoriates the anus and neighbouring parts. The fever increases with the other symptoms; the skin is dry, parched, and accompanied with a biting heat; the eyes become red, heavy, and watery; the countenance is either full and bloated, or pale, shrunk, and dejected, and the patient frequently complains of an unusal sense of oppression and debility; the pulse is small, frequent, and irregular; the respiration is more or less hurried, and as the disease advances the breath becomes very fetid, and is often disagreeable to the patient himself; and there is generally a considerable discharge of a sanious-like matter from the fauces; the voice is frequently very much altered, and when the inflammation has attacked the organs of respiration, it assumes a wheezing or ringing sound, the respiration becomes difficult, and the patient is teased with a troublesome cough; the fever suffers an evident exacerbation in the evening, during which, some rattling is perceived in the breathing, and there is generally a remission in the morning; great debility, prostration of strength, and restlessness, accompanied with frequent sighing, as in the typhus gravior, supervene, and if neither delirium nor coma appeared at an early period, they generally come on in the progress of the complaint. On the second or third, rarely later than the fourth day, an erruption appears upon the skin, which, for the most part, in the first instance, shews itself upon the neck and breast; it comes out in blotches of a dark purple or raspberry hue, and gradually spreads over the trunk and extremities; the scarlet redness is often considerable on the hands and extremities of the fingers, which feel stiff and swelled; the stains, when nearly inspected, appear to be composed of small prominences, which may sometimes, although rarely, be distinguished by the eye, more frequently by the touch only; the erruption is as regular in its appearance as it is in its steadiness and continuance; it generally, however, disappears about the fourth day, and a desquamation of the cuticle takes place; but neither on its first appearance, nor on its desquamation, does it always produce a remission of the fever or of the other symptoms, except the vomiting, which generally abates on its first appearance. As the disease advances, the ulcers on the fauces become of a livid or black colour, the pulse becomes more depressed, and the symptoms attending the latter stages of the typhus gravior come on, and the patient is generally cut off either by a diarrhœa, or by a profuse hæmorrhage from the intestinal canal, nose, mouth, or ears, often on the third day, sometimes later, but for the most part before the seventh. The complaint sometimes spreads into the trachea; the parotid and the other lymphatic glands also in the vicinity of the fauces, in consequence of the absorption of the putrescent matter, are sometimes so much swollen as to endanger or induce suffocation.

*Causes.*—This disease is produced by a specific contagion, and those will be more liable to be attacked by it who are of a sickly habit of body, and who have been exposed to the remote causes of the typhus gravior: it has been frequently observed of this, as of most other epidemics, that it is most fatal on its first appearence, gradually becoming milder, till towards the end, when it is attended with scarcely any danger; at the same time, other complaints seldom prevail much while it rages, or if they do, are generally catenated with its symptoms.

*Treatment.*—In the management of this often fatal and insidious disease, we must keep its tendency to depression of strength and gangrene constantly in view, and at the same time attend to certain troublesome symptoms, which frequently accompany this disease. Emetics, at the commencement of the disease, must on no account be dispensed with; but as in this species of cynanche there is so great a tendency to diarrhœa, they should in general consist of the ipecacuanha only; sometimes, however, a small portion of Dr. James's powder may be added with advantage. The intestinal canal must be evacuated by the most gentle laxatives, for which purpose, the mercurial cathartics are particularly recommended; in the more advanced stages of the disease they will be improper, as there is generally a spontaneous diarrhœa: the regular expulsion of the feces should be solicited by clysters only; but towards the termination, when the bowels are loaded with putrid sordes, accumulated in them during the disease, which protracts the fever and impairs the appetite, gentle cathartics will be serviceable: even in this case we must not venture to employ them, unless the fauces have a healthy appearance, and there is a considerable abatement of the febrile symptoms. Small repeated blisters should be applied to the external fauces; rubefacients, however, may in general be employed with equal advantage and more safety; the fauces must be preserved from the effects of the acrid matter, discharged from the ulcers, by the diligent use of antiseptic or rather stimulating

gargles, as the decoction of bark with muriatic or sulphuric acid, or the bark in port wine, a small quantity of which should be frequently employed or injected into the fauces by means of a syringe; a small quantity of a gargle, composed of alum, in the proportion of an ounce to a pint of water, is recommended to be frequently injected into the fauces, which is said to remove the fetor from the ulcers; but the most powerful gargle is prepared by mixing a teaspoonful or two of the capsicum annuum or Guinea pepper and a teaspoonful of sea-salt with three ounces of distilled vinegar, and the same quantity of boiling water, a small quantity of which is advised to be taken into the fauces every two hours, so as to produce and keep up a moderate degree of excitement on the tonsils, uvula, and fauces. Wine, opium, bark, mineral acids, and the other remedies recommended in the treatment of the typhus gravior, must be employed with assiduity. As children can rarely be prevailed upon to take the necessary medicines in sufficient quantities, the bark and cordials should be exhibited by clysters. Diarrhœa is to be checked by opiates and astringents, excepting it arise, as a salutary crisis, towards the close of the disease; in which case rhubarb in gentle doses is the very best moderating remedy.

*Rheumatismus.* Rheumatism.--Of this disease there are two species, the Acute and the Chronic. The former generally commences with the usual symptoms of fever, preceded or succeeded by acute and pungent pains in the joints; the pain is not, however, confined to the joints, but it frequently shoots along the muscles from one joint to another; the parts most commonly affected are, the hips, knees, shoulders, and elbows, more rarely the ankles and wrists; the pain is much increased upon the slightest motion, or even by the heat of the bed; there is some degree of swelling and redness in the parts most affected, which are painful to the touch; the pulse is frequent and full: and the patient is generally costive; the urine at the commencement of the disease is high coloured, and generally without sediment; but, on the remission of the symptoms, it deposits a lateritious one, and there is a tendency to sweating in this course of the disease, which rarely brings relief: an exacerbation of the febrile symptoms takes place every evening, and a remission towards morning, and the pains are most severe and most apt to shift their place in the night-time. Dr. Darwin suspects that rheumatism is not a primary disease, but the consequence of the translation of morbid action from one part of the system to another, which idea, he observes, is countenanced by the frequent change of place in rheumatic inflammation, and from its attacking two similar parts at the same time, as both ankles, and both wrists, and these attacks being in succession to each other; and he further remarks, that this accounts for rheumatic inflammation so very rarely terminating in suppuration, as the original cause is not in the inflamed part; but, instead of suppuration, a quantity of mucus, or coagulable lymph, is formed on the inflamed membrane, which is either re-absorbed, or lies on it, producing pains on motion long after the termination of the inflammation.

The remote *causes* of this disease are, frequent vicissitudes of the weather; cold suddenly applied to the body when under perspiration; the long continued application of cold, particularly when combined with moisture, as when damp or wet clothes are applied to the body or extremities for any considerable length of time; plethora; cold caught when the system is under the influence of the hydrargyrus; certain seasons of the year, as spring and autumn. The proximate cause is supposed to be an inflammation of the membranes, and tendinous aponeuroses of the muscles.

The *cure* of this species of the disease will be effected by removing the morbid excitement, by a strict adherence to the antiphlogistic regimen, by blood-letting, which must be repeated in proportion to the degree of strength and hardness of the pulse, and violence of the symptoms; we must not however push general evacuations too far, as they not only retard the recovery of the patient, but frequently induce an obstinate chronic state of the disease; topical evacuations, by means of leeches or cupping, may after general blood-letting be advantageously employed, when the pain becomes fixed in the joints, attended with some degree of redness and swelling; gentle saline or mercurial cathartics, or laxative clysters, should be frequently administered; a gentle diaphoresis should be excited by means of the neutral salts, or of saline draughts combined with nauseating doses of tartarised antimony and the sulphuric or nitrous spirit of æther, or camphor may be employed in combination with volatile salt of hartshorn; cooling mucilaginous diluents are to be taken freely; the diet should consist of food of little stimulus, and the cure will be further promoted by the warm bath: when the excitement has been subdued, bark combined with chalybeates, and the myrrh or opiates combined with ipecacuanha, may be administered with great advantage; rubefacients are of service, and blistering should be employed when the excitement is considerably reduced, and the pain is much confined to one part. Bark has of late been recommended to be administered in every stage of the disease, and there is no doubt that it may be employed, not only with great propriety, but with safety, if the pain be attended with distinct remissions, and assumes more or less the form of an intermittent; when the excitement, however, is considerable, it will be advisable to premise some general evacuations.

The remote *causes* of chronic rheumatism are, preceding acute rheumatism, cold applied partially to the body when heated, and most of the causes producing the other species. The proximate cause is supposed to be atony of the blood-vessels and muscular fibres of the part affected, together with some degree of rigidity and contraction in those fibres: and the removal of this complaint must be attempted by restoring the activity and vigour of the part affected, and also that of the system in general; by the usual remedies for this purpose; and especially by the use of guaiacum and other warm resins, mustard-seed, and horse-radish: with a local application of volatile liniments and the flesh-brush. The warm-bath, or Buxton waters, may also be employed with advantage.

*Gout.*—Of this disease there are four species or varieties, the Regular, Atonic, Misplaced, and Retrocedent: it is not necessary, however, to dilate upon each separately.

This disease sometimes makes its attack without any previous warning; in general, however, the inflammation of the joint is for some days preceded by great languor and dulness both of body and mind, doziness, giddiness, wakefulness, or unrefreshing sleep, wandering pains, a deficiency of moisture in the feet, and there is sometimes a coldness, numbness, and sense of prickling in the feet and legs; these symptoms are often, in a greater or less degree, accompanied with frequent cramps of the muscles of the legs and toes, an universal tur-

gescence of the veins, occasional chills, acidity and flatulence in the stomach, and an increased or impaired appetite; the appetite is, however, frequently more keen than usual on the day preceding the attack of the fit: on going to bed, the patient enjoys his usual natural sleep, until about two or three o'clock in the morning, when he is awakened by a very acute pain, most commonly in the first joint of the great toe; sometimes, however, it attacks other parts of the foot; the pain resembles that of a dislocated bone, and is attended with the sensation as if all but cold water was poured upon the part; there is, at the same time, more or less of a cold shivering, which abates as the pain increases in violence, and is succeeded by a hot fit; the pain, from the commencement, gradually becomes more violent; it is sometimes so acute, as to be compared to a dog gnawing the part, and that and the fever continue in the same state, accompanied with great restlessness, till next midnight, when they gradually remit, and after a continuance of twenty-four hours, from the commencement of the paroxysm, they commonly cease entirely; the patient falls asleep, during which a gentle perspiration generally comes on, and on waking, he finds the part affected somewhat red and swelled: for some days, the pain and fever return in the evening, but with a less degree of violence, and a remission takes place towards morning; and after these symptoms have continued for about ten or fourteen days, gradually becoming less severe, they generally cease altogether: costiveness, an impaired appetite, chilliness of the body towards evening, are also to be reckoned among the symptoms of this disease.

The indications of *cure* are, in the paroxysms, to moderate their violence and shorten their duration as much as can be done with safety; and in the intervals, to prevent the return of the paroxyms, or to render them less frequent and more moderate. The violence of the paroxysm will be moderated by blood-letting, which must be repeated according to the state of the pulse and degree of excitement, where the constitution is not worn down by repeated attacks; leeches should be applied to the inflamed parts, and gentle cathartics should be administered, these parts should also be exposed to cool or cold air, and diluting liquids should be taken freely: the application of cold water is at present a doubtful practice: the antiphlogistic regimen must be strictly adhered to; abstinence from wine, spirits, fermented liquors, and stimulating food, should be carefully enjoined, unless the system is very much debilitated, in which case, a more nourishing diet, and a small quantity of wine or of diluted spirits, may be allowed; after the excitement has been subdued by proper evacuations, blisters may be employed with advantage; they are recommended by that enlightened physician, Dr. Rush, to be applied to the legs and wrists; burning with moxa may be advised, or a cabbage-leaf applied to the part affected will often afford considerable relief; bootlets made of oiled silk are an useful application to gouty joints; when the violence of the symptoms is abated, opiates may be given with advantage, when the pain only returns during the night, and prevents sleep: when the constitution is broken down by repeated attacks of the disease, evacuations must be employed with caution, and it will, in general, be more advisable and safe to allow some animal food, and wine or diluted spirits; the parts affected should, at the same time, be wrapped in flannel, fleecy hosiery, or new combed wool, and a gentle diaphoresis should be excited; when a swelling and stiffness remain in the joints after the paroxysm has ceased, they will be removed by the diligent use of the flesh-brush, gentle exercise of the parts, and the Buxton or Bath waters taken at the fountain head; and where the gout has left a number of dyspeptic symptoms, the latter may be drank with considerable advantage; purging immediately after a paroxysm will be very apt to induce a relapse. In the intervals we must endeavour to prevent a return of the paroxysms, or to render them less violent, 1. by temperance, which should be regulated according to the age, habits of life, and constitution of the patient: it is very probable, that a diet consisting of milk, vegetables, and water, would prevent the recurrence of the disease; but in general, fish, eggs, the white meats, and weak broths, may be taken in small quantities once a day, and a little salted meat may be eaten occasionally, and weak wine and water, or small beer, may be taken at meals. As there is a disposition in the gout to return in the spring and autumn, a greater degree of abstinence in eating and drinking will be necessary at those seasons than at any other period; and if any of the premonitory symptoms are then present, and the vigour of the system remains unimpaired, the disease may be often prevented from occurring, by the loss of a few ounces of blood, or, perhaps, by an emetic or a gentle cathartic, and afterwards bathing the feet in warm water; a full dose of the tinctura opii might probably be of service. In the decline of life, or when the constitution is much debilitated, this abstemious mode of living must be commenced with caution, as it might be the means of inducing more violent and dangerous fits of the gout. 2. By moderate labour and gentle exercise, as riding on horse-back, but more particularly walking. 3. By avoiding cold, especially when it is combined with moisture; the feet should be kept constantly warm and dry, by means of socks and cork-soled shoes, and the patient should wear flannel next to the skin. 4. By the prevention of costiveness, by means of gentle laxatives, as aloetics, combined with soap and rhubarb, or oil of castor. 5. By tonics, as the bark, quassia, and chalybeates. 6. By the exhibition of alkalies in various forms, as the fixed alkali, both mlid and caustic, lime water, soap, and the absorbent earths; and lastly, by studiously avoiding the exciting causes. In the retrocedent species, strong stimulants both external and internal should be instantly employed with an unhesitating hand; and in the atonic species the diet should be peculiarly generous, and compounded of spices and other aromatics.

### Order III.

*Exanthemata.* Eruptive fevers.—These consist of the following genera. 1. Erysipelas, or St. Anthony's fire. 2. Pestis; plague. 3. Variola; small-pox. 4. Varicella; chicken-pox. 5. Rubeola; measles. 6. Miliaria; miliary fever. 7. Scarlatina; scarlet fever. 8. Urticaria; nettle-rash. 9. Pemphigus; bladdery fever. 10. Aphthæ; thrush. The whole of this order is defined by Cullen to consist of diseases affecting persons only once in their life, commencing with fever, and succeeded by phlogoses generally small in size, considerable in number, and dispersed over the skin. The definition, however, will not hold good in several of its clauses, and especially in its first: for perhaps there is not a single disease in the list but what has occasionally recurred, and many of them repeatedly. It is to be remarked through the whole of these, that whatever danger may accompany them depends rather upon the degree of fever, and the nature of the fever that introduces them,

than upon the extent or nature of the eruptions themselves: and hence, with very few exceptions, the genera, plan laid down for the treatment of the different genera in the order Febres is the plan which ought to be followed in the order before us. Thus the fever accompanying plague is evidently typhus, which, in effect, when accompanied by eruptions of any kind, is evidently a typhoid eruptive fever, and requires the same treatment as typhus. Chicken-pox and nettle-rash have a near approach to synocha, and so far possess the same indications; but they are generally slight diseases, and of not more than three days duration. The rest, for the most part, are of a mixt breed, and have hence a closer resemblance to synochus: they commence with inflammatory affections, but have soon a strong tendency to run into the putrid type. We shall select an example or two from the diseases of this order either most important or most frequent.

*Variola.* Small-pox.—This is of two varieties, the distinct and the confluent. The general nature, symptoms, and treatment of the former, are so well known, that it is unnecessary to repeat them. In the confluent kind, our chief attention must be directed to support the strength of the system, and to obviate the tendency to great depression of strength and putrefaction of the fluids, which will be effected by the exhibition of cordials, wine, bark, mineral acids, and nourishing diet, and by all the means recommended in the treatment of typhus, except the application of cold water after the appearance of the eruption; the bowels should be kept regular by the mildest cathartics, or by laxative clysters; some authors, however, recommend a more liberal use of them, unless a diarrhœa has supervened, even when the disease assumes the type of typhus; when the disease is attended with violent symptoms, blisters should be applied in succession, on different parts of the body, without regard to the parts being covered with pustules; if there be obstinate vomiting, the saline draughts should be given in a state of effervescence; or camphor, combined with opium, may be employed with advantage, the extract of cascarilla administered in some aromatic liquid: is often of use in allaying the vomiting; and if we do not succeed by those means, it will be proper to apply a blister to the region of the stomach: should the epileptic fits continue violent, it will be necessary to administer opiates, both by the mouth and by clysters, which act not only by their antispasmodic power, but also by perspiration, and mustard cataplasms should be applied to the feet; at the same time gentle cathartics will be necessary, as the recurrence of the fits frequently proceeds from the irritation of retained feces, especially in children: when a retrocession of the eruption happens, wine, opium, volatile alkali, musk, and camphor, with the warm bath, are the remedies most generally employed; blisters and mustard cataplasms should also be applied to the lower extremities: if the swelling of the face subsides suddenly, and is not succeeded by the swelling of the hands, blisters are recommended to be applied to the wrists and fore arms; anointing great part of the body with mercurial ointment, or applying a large mercurial plaster to the scrobiculus cordis under the same circumstances, is often attended with good effects; if the salivation suddenly cease without any swelling of the hands, blisters should be applied to the wrists, and small doses of the ipecacuanha should be administered: should there be a suppression of urine, the patient should be exposed to a current of cool air; if this does not succeed, and he is not in a very debilitated state, and the heat of the body is steadily above the natural degree, it will be proper to dash cold water upon the legs, and perhaps to extend the affusion over the whole surface.

*Rubeola.* Measles.—This disease will be distinguished from the other exanthemata, by the dry hard cough, hoarseness, sneezing, watering of the eyes, coryza, dyspnœa, and great drowsiness, or coma. From catarrh, the greater violence of the febrile symptoms. the greater affection of the eyes, and many of the symptoms, accompanying the eruptive fever of measles, particularly the coma, will afford a ready diagnosis between the two diseases.

The *remedies* indicated in the cure of this disease are such as will obviate or remove the morbid excitement; blood-letting will therefore be requisite in proportion to the violence of the fever, cough, and dyspnœa, if the nature of the prevailing epidemic does not contra-indicate; but, as the danger at the commencement of the complaint is for the most part inconsiderable, that powerful remedy may, unless the excitement is very great, and threatens immediate danger or much subsequent debility, generally be reserved till after the period of desquamation, which is often succeeded by a more dangerous train of symptoms than any that have preceded; gentle cathartics are indispensably requisite in all cases, such as phosphat of soda, Epsom salts, infusion of senna, &c.; analogy is, however, greatly in favour of calomel; tepid mucilaginous diluents should be freely allowed; it will be advisable to excite a gentle diaphoresis by means of the saline draughts, with small doses of the tartris antimonii; the cough will be alleviated, and expectoration promoted by a solution of spermaceti, gum arabic, or of the pulvis tragacanthæ compositus, or the decoctum hordei compositum may be employed in considerable quantities; inhaling the vapour of hot water, the application of oil round the chest, and the pediluvium, or warm bath, will be found useful auxiliaries: should the cough and dyspnœa prove urgent, attended with pyrexia, or should they remain after the desquamation, blood-letting, either general or local, should be employed: we must, however, be cautious in reducing the strength of the patient; small blisters should be applied in succession about the thorax; the apartment in which the patient continues should be kept cool, he must not be exposed to cold air so freely as in the small-pox, as much disorder may be produced in the system, if, from such exposure, retrocession of the eruption should take place; the degree of temperature should, therefore, in a great measure be regulated by the patient's feelings: when the excitement is subdued by evacuations, and the cough remains the only troublesome symptom, opiates may then be given with great advantage, and at this period of the disease a change of air will be of the most essential service. As a morbid tendency remains for some time after this complaint, it will be not only advisable, but indispensably necessary, to administer gentle cathartics at proper intervals. If symptoms of pneumonia should supervene after the desquamation, blood-letting, both general and local, if the strength of the patient will admit of it, blisters, and the other remedies, which are mentioned when treating of that inflammation, must be diligently employed: when a diarrhœa remains troublesome after the desquamation has taken place, it must not be checked too hastily by the employment of astringents and opiates, on account of the tendency to inflammatory complaints which remains after the measles; the cascarilla, or colomba may, however, be employed in small doses,

before we have recourse to more powerful astringents; blood-letting will generally remove both the diarrhœa and cough; it will, therefore, be advisable to endeavour to check the diarrhœa by that evacuation, rather than employ astringents in the first instance. The putrid measles appeared in London in 1672, 1763, and 1768; and have appeared occasionally since: in this variety all the symptoms are more violent, accompanied with greater depression of strength: the remedies must be of the same kind, but more actively and instantaneously employed.

*Scarlatina.*—The general nature and treatment of this disease will be found in *Typhus* and *Cynanche Maligna.*

*Erysipelas.* St. Anthony's fire.—This disease will be readily distinguished from the scarlatina cynanchica by the absence of the pain, redness, tumour, and sloughs, in the fauces and tonsils, and by the other concomitant symptoms. The danger will be in proportion to the violence of the symptoms denoting a tendency to an affection of the brain; the parts which were red becoming suddenly pale, and a considerable degree of coma or delirium, particularly at the commencement of the disease, with an increase rather than diminution of it, after the appearance of the eruption, are symptoms of the utmost danger. When the disease terminates in a favourable manner, there is sometimes a gentle diaphoresis; more frequently, however, the disease goes off without any evident crisis.

In the removal of this disease, if there is a considerable degree of excitement, attended with much coma or delirium, and a strong, full, and hard pulse, blood-letting will be necessary, and it should be repeated according to the urgency of the symptoms, strength of the patient, and state of the pulse; an emetic should be given at the commencement of the fever, unless the head is affected, in which case it is at least a doubtful remedy; cooling purgatives are particularly useful; mild diaphoretics, assisted by the plentiful use of mucilaginous acidulated diluents, will be proper; the antiphlogistic regimen must be strictly adhered to, and the patient should be placed in as erect a posture as he can bear without inconvenience; if the delirium, but more particularly the coma, is urgent, blisters should be applied to the shaved head, or between the shoulders, cupping should be advised, and mustard cataplasms should be put upon the soles of the feet. The erysipelatous eruption sometimes shews itself in typhus, and increases the fever, in which case, we must have immediate recourse to bark, wine, cordials, the sulphuric acid, and the other remedies for that disease. Where the eruption returns periodically, issues and a low diet will frequently prevent it.

### Order IV.

*Hemorrhagiæ.* Sanguineous fluxes.—These are thus ordinally defined; pyrexy, with a flow of blood without external violence; the blood upon venæsection exhibiting the same appearance as in phlegmasia. The genera are: 1. Epistaxis; bleeding from the nose. 2. Hæmoptysis; spitting of blood. 3. Hæmorrhois; piles. 4. Menorrhagia; immoderate menstruation. This, for the most part, and when the profusions are not merely symptomatic or critical, are a natural class of diseases; and, excepting in one or two instances, are to be attacked by a general plan of a similar kind and tendency. They are preceded for a longer or shorter time by a sense of fulness and tension in the parts whence the blood is about to issue; if these parts be visible there is redness, tumour, a sense of heat or itching, and of pain and weight: internally in the neighbourhood, there is a similar sense, weight, fulness, tension, heat, and pain; and when these symptoms have subsisted for some time, a cold fit comes on, attended with weariness of the limbs, pains of the back and head, costiveness, and other febrile symptoms, succeeded by a hot fit, in the course of which the blood most commonly flows in a greater or less quantity, and after an uncertain time it ceases spontaneously; during the hot stage, the pulse is frequent and full, and in many cases hard, but as the blood flows, the pulse becomes softer and less frequent, and the blood, when drawn from a vein, appears as in the cases of the phlegmasiæ. After an hæmorrhage has once occurred, it frequently observes periodical returns.

The remote causes are, a plethoric and sanguine temperament; the suppression or diminution of accustomed evacuations; changeable weather, as spring and autumn; considerable and sudden diminution in the weight of the atmosphere; external heat; violent exercise of particular parts of the body; whatever increases the force of the circulation, as violent exercise, violent efforts, anger, and other violent active passions; postures of the body increasing determinations to, or ligatures occasioning accumulations in, particular parts of the body; a determination to certain vessels rendered habitual from the frequent repetition of hæmorrhage; mal-conformation of particular parts, and lastly cold externally applied, as changing the distribution of the blood, and determining it in greater quantities into the internal parts, or, perhaps, by its exciting some degree of synocha. The proximate cause is supposed to be congestion in particular parts of the sanguiferous system, occasioning distention of these vessels, and violent re-action, the consequence of which is a rupture of them.

*Treatment.*—When an hemorrhage has taken place, and threatens to go to excess, we must endeavour to moderate or check the flow of blood, and prevent its return: the first indication will be answered by a strict adherence to the antiphlogistic regimen, therefore the removal of every cause of irritation is always necessary, the patient must be kept quiet and still, heat must be particularly guarded against, he should be freely exposed to the cold air, and should be allowed cold or iced water, or iced lemonade to drink; every exertion of mind or body is to be avoided; a vegetable diet will be most proper, unless the strength of the patient is greatly exhausted, in which case, mild broths, and the mildest kind of animal food, may be allowed; gentle cathartics or laxative clysters will be necessary to prevent any accumulation of the fæces, and blood-letting will be requisite, if there is a considerable degree of excitement; dry-cupping is frequently useful, and blisters may be employed with advantage: vomiting is a powerful remedy in diminishing the action of the heart and arteries; the digitalis, however, in our opinion, is a much more preferable remedy; refrigerants should be ordered, as the sulphuric acid, nitre, cream of tartar, and the vegetable acids, the first of which is, however, the most efficacious medicine. Internal and external astringents must also be employed; of the former class are the vitriolic acid, alum, and the sugar of lead, which is by far

the most powerful remedy, and may occasionally be exhibited with advantage in small doses, but the long continued use of this remedy is often attended with dangerous consequences, and it should be given in combination with the opium pill, or some tenacious extract, in order to obviate its pernicious effects on the stomach and bowels. The external astringents in most general use are, cold applied suddenly, cold water, in which salt has been recently dissolved, or powdered ice, or solutions of sugar of lead, alum, or white vitriol, &c.; pressure is a powerful means of checking hæmorrhage, when it can be applied to the part; when the hæmorrhage is very profuse, it is improper to employ any means to prevent syncope, unless it partakes very much of the passive state, in which case it must be prevented by every possible means; the cinchona with chalybeates are indicated under the same circumstances: when the phlogistic diathesis is taken off, either by the continuance of the hæmorrhage, or by proper remedies, opiates may be given with advantage, and should subsultus tendinum, or convulsions supervene, they are particularly serviceable, combined with the camphora, castoreum, and the moschus. The return of the hæmorrhage is to be prevented by our counteracting or preventing a plethoric state of the system, by an abstemious diet, or by taking food of a less nutritious quality, by exercise, gestation will be generally more safe than walking, by gentle cathartics, by cold bathing, bitters, and aromatics, which tend to prevent plethora, by increasing the tone of the vessels, and by studiously avoiding the remote causes; tonics, which must increase the force of the circulation, although indicated, are doubtful remedies, in particular bark and chalybeates; astringents are in general more efficacious, particularly the sulphuric acid, alum, &c. If the plethoric state, notwithstanding our endeavours, should become considerable, and a return of the hæmorrhage is threatened, blood-letting, both general and local, and blisters, will be proper when the vis a tergo is great, but when the habit is debilitated, it will be more advisable to employ only local blood-letting and blisters; it will be proper to remark, that blood-letting should always precede the employment of blisters.

These directions will suffice for the treatment of hæmorrhagies in general. Upon menorrhagia we shall enter more fully in the article MIDWIFE, and shall only in the present place offer a few words on phthisis.

Phthisis, pulmonary consumption, upon the Cullenian system is made a species of hæmoptysis. The impropriety of thus naming a disease from a single and that only an occasional symptom must be obvious to every one. But our only duty at present is to describe the disease. This is generally preceded by more or less of the following symptoms; a slight degree of fever, increased by the least exercise; a dry burning heat of the palms of the hands, particularly towards evening, and of the soles of the feet towards morning; moisture of the eyes after sleep; irregular flushings; hoarseness; a dry, troublesome, and sonorous cough, occasioning slight pain or stitches, most commonly in the sides; some degree of hardness of the pulse; lancinating or fixed pains in the thorax; headache; frequent fainty fits; some degree of dyspnœa, increased on using exercise; an expectoration of a small quantity of thin, frothy matter; impaired appetite; restless nights, and universal disinclination to motion or exercise: this may be termed the inflammatory or first period. In a short time the fever becomes more severe, with accessions in the afternoon or evening, and some remission in the morning, the pulse, however, is even then quicker than natural: the cough is increased by a recumbent posture, and prevents sleep till towards morning, when a slight moisture appears upon the breast and upper parts of the body; the expectoration increases in quantity, is frothy, and sometimes streaked with blood; the face is commonly pale, but during the fever the cheeks appear as if painted with an almost circumscribed spot of pure florid red; the feverish heat is augmented after eating, particularly solids, and on taking exercise; the burning heat in the palms of the hands and soles of the feet becomes more perceptible; there is difficulty of lying on one more than the other side, wandering or fixed pains are felt in some part of the thorax, and the disease is accompanied with lassitude and asperity of the temper: the appetite becomes somewhat impaired, and there is frequently vomiting after eating. As the disease advances, the hectic fever is established, and the remissions become more distinct, attended with colliquative morning sweats; an exacerbation occurs about noon, and a slight remission happens about five in the afternoon; this is soon succeeded by another exacerbation, which gradually increases until after midnight, but after two o'clock in the morning a second remission takes place, and is attended with more or less, sometimes profuse, sweating, which greatly debilitates the body; sometimes, however, the second exacerbation in the evening is not observed, but the exacerbation, which took place about the middle of the day, increases till evening, continues violent until the morning sweat breaks out, when the patient gets some unrefreshing sleep; the exacerbations are frequently attended with some degree of cold shivering, or more frequently only a sense of chillness or increased sensibility to cold is perceived, when to the thermometer the skin is preternaturally warm: the expectoration now becomes more viscid, copious, yellow, greenish, streaked with blood, disagreeable to the taste, and is discharged in small spherical masses, resembling pus, and is frequently also of an ash-colour; the cough abates in violence, but not in frequency, and is more distressing in the first part of the night, the breathing is short and quick, and the breath has an offensive smell; the pulse is frequent, full, and tense, or small and quick; the countenance now gives evident signs of wasting, the eyes lose their lustre and brilliancy, sink, grow dull and languid, the cheeks appear prominent, the nose sharp, the temples depressed, and the strength rapidly declines; this may be esteemed the second period: from the beginning the appetite is less affected than could be expected, the body is for the most part costive, particularly after the morning sweats have begun to take place; the urine is generally high coloured, and deposits a curdly pink sediment; about this period, in females, sometimes sooner, the menstrual discharge ceases in consequence of the increasing debility. The third stage commences with a slight purging, which soon becomes a colliquative diarrhœa; when this takes place, the fever, heat, and morning sweats abate, but the cough continues distressing through the night: the tunica adnata becomes of a pearly white, the tongue appears clean, and with the fauces, is of a bright red colour, sometimes covered with aphthæ, and generally sore and tender; the voice grows hoarse, and there is shortness of breath and hiccup, both of which distress the pa-

tient greatly; the lower extremities swell, and retain the impression of the finger; at this stage of the disease, sometimes sooner, the appetite is observed to become unnaturally keen, which deludes the unhappy sufferer and friends: as the disease advances, the diarrhœa becomes more violent, and sometimes alternates with the sweats, the strength rapidly decays, and memory and their affections forsake them; as the fatal period approaches, they have frequent and long faintings, the hairs fall off, the nails are incurvated; sometimes there are slight convulsions, and a few days before death delirium comes on, and continues till that event takes place, or the senses remain entire, and the mind continues still confident and full of hope, till death steps in and gently puts an end to their hopes and sufferings. As it is a matter of consequence to distinguish pus from mucus, we shall subjoin the following ingenious experiments of the late Mr. Charles Darwin.

1. Pus and mucus are both soluble in the sulphuric acid, though in very different proportions, pus being much the less soluble. 2. The addition of water to either of these compounds decomposes it; the mucus thus separated either swims on the mixture, or forms large flocci in it; whereas the pus falls to the bottom, and forms, on agitation, an uniform turbid mixture. 3. Pus is diffusible through a diluted sulphuric acid, though mucus is not; the same occurs with water, or a solution of the muriate of soda. 4. Nitrous acid dissolves both pus and mucus; water added to the solution of pus produces a precipitate, and the fluid above becomes clear and green, while water and the solution of mucus form a dirty coloured fluid. 5. Alkaline lixivium dissolves (though sometimes with difficulty) mucus, and generally pus. 6. Water precipitates pus from such a solution, but does not mucus. 7. Where alkaline lixivium does not dissolve pus, it still distinguishes it from mucus, as it then prevents its diffusion through water. 8. Coagulable lymph is neither soluble in diluted, nor concentrated sulphuric acid. 9. Water produces no change on a solution of serum in alkaline lixivium, until after long standing, and then only a very slight sediment appears. 10. The muriate of mercury coagulates mucus, but does not pus. From the above experiments, it appears that strong sulphuric acid and water, diluted sulphuric acid, and caustic alkaline lixivium and water will serve to distinguish pus from mucus; that the sulphuric acid can separate it from coagulable lymph, and alkaline lixivium from serum; and hence, when a person has any expectorated material, the composition of which he wishes to ascertain, let him dissolve it in sulphuric acid, and in caustic alkaline lixivium, and then add pure water to both solutions; and if there is a fair precipitation in each, he may be assured that some pus is present: if in neither a precipitation occurs, it is a certain test that the material is entirely mucus: if the material cannot be made to dissolve in alkaline lixivium by time and trituration, we have also reason to believe that it is pus. To the above ingenious experiments may be further added, the coagulation of pus by the muriat of ammonia, as observed by Mr. Home, and its globular appearance through the microscope; pus is also of the consistence of cream, of a whitish colour, and has a mawkish taste; it is inodorous when cold, and when warm it has a peculiar smell.

The predisposing *causes* are, hereditary disposition; mal-conformation of the chest; sanguine temperament; scrofulous diathesis, which is indicated by a fine, clear, and smooth skin, large veins, delicate complexion, high-coloured lips, the upper one swollen, white and transparent teeth, light hair, and light blue eyes, with a dilated pupil; there is great sensibility, uncommon acuteness of the understanding, and a peculiar gentleness and softness in their manner; the immoderate use of venery; certain diseases, as the hooping-cough; syphilis, and various exanthemata, particularly the measles; various employments, as stone-cutters, needle-grinders, flax-dressers, and all sedentary occupations, particularly those which require a considerable degree of stooping; the retrocession of eruptions; indulgence in intoxicating liquors, and, according to Dr. Beddoes, hyper-oxygenation of the blood. The exciting causes are, hæmoptysis; empyema; catarrh, particularly the influenza; asthma; obstructions of the abdominal viscera, particularly an enlarged and indurated state of the liver; calculi formed in the lungs; contagion and tubercles. The proximate cause is supposed to be an ulcer in the lungs.

The *prognosis* in this disease depends upon the causes from which it originates, and upon the violence of the symptoms; if it is in consequence of empyema or tubercles, there is more danger than when it arises from hæmoptysis or wounds in the chest, but every case of phthisis is always attended with danger: the progress of phthisis is often interrupted by pregnancy and mania; the latter has produced a radical cure, but in the former it almost always returns after delivery with increased violence.

In the *treatment* of this disease it will be particularly expedient to avoid, and if in our power, to remove the occasional causes mentioned above, by the proper methods, which are mentioned in other parts of this treatise; if several of the premonitory symptoms, as a dry, short, troublesome cough, occasional stitches in the sides, slight dyspnœa upon using exercise, and a pulse somewhat accelerated and hard, should attack a person of a phthisical habit, the most powerful remedies must be employed without loss of time: blood-letting in a moderate quantity will be necessary, and it should be repeated at proper intervals till those symptoms are relieved, taking care, however, not to reduce the strength of the patient too much, as debility is the most urgent symptom in the course of the disease: the bowels should be kept regular by gentle cathartics, as the calomel and rhubarb. After these evacuations, the ipecacuanha, either alone or with a small quantity of emetic tartar, should be given in the morning fasting, in such doses as will excite vomiting once or twice at most; when the heat, fever, cough, and pain in the chest are considerable, small doses of the nitre, or the saline mixture, with nauseating doses of the emetic tartar, should be given three or four times in the course of the day: in this stage of the disease, small doses of the calomelas administered at bed-time are of considerable service, except there is a tendency to diarrhœa, as the bowels, by its use, are not only kept regular, but it, at the same time, acts as a powerful deobstruent, and, in our opinion, an alterative course of mercury is of advantage, in the incipient stage of phthisis, for the removal of indolent tubercles: should the cough prove violent, opiates may be given at bed-time, and in the night if necessary, the extractum papaveris albi, in doses of five grains or more, is particularly suitable; if there is a fixed pain in the breast or sides,

increased upon coughing, local blood-letting and small blisters applied in succession about the thorax will afford considerable relief, or a seton may be made as near the part affected as possible. In the second stage of the disease, the employment of emetics, composed of the ipecacuanha with a few grains of the sulphat of zinc, must be duly persisted in, in the morning fasting: when the morning sweats are very profuse, the infusion of roses or vitriolic acid should be employed with freedom; æther, in the proportion of two or three drachms to a pint of water, with some of the mucilage of quince seeds, makes a grateful and slightly tonic mixture, a glassful of which may be taken frequently, or the Bristol or Seltzer water may be drank; they are very efficacious in moderating the thirst, burning heat of the palms of the hands and soles of the feet, and the partial night sweats; opiates must be given in such doses as will quiet the cough and procure sleep, taking care, however, to obviate costiveness, and if the patient feels a sickness in the morning after them, coffee will effectually remove it; mucilaginous fluids, combined with small quantities of the spermaceti, are also of service in allaying the irritation in the fauces. When the inflammatory diathesis is subdued, chalybeates, combined with myrrh and carbonat of potash, may be given with advantage; lime-water is a suitable menstruum for dissolving the myrrh. The digitalis is strongly recommended in these two stages in particular; it certainly is deserving of a fair and impartial trial, and appears to be a medicine well suited to this disease, more especially in the inflammatory stage, from its well known power of rendering the action of the heart and arteries more slow than natural, a desideratum in phthisis, in which the pulse ranges from eighty to one hundred and twenty, or more; it also is very efficacious in exciting the action of the absorbents: the factitious airs may also prove an useful auxiliary, or air impregnated with the oxyd of zinc, or manganese in their most comminuted state, might be applied to the lungs by means of an apparatus, as recommended by Dr. Darwin in his Zoonomia, or by that of Mr. Watt of Birmingham: the vapour of a saturated tincture of æther, impregnated with hemlock, may be inhaled; it is made by macerating for a few days from one to two scruples of the dried leaves of the conium in an ounce of the æther. The hectic paroxysm may be prevented, or cut short, by the affusion of tepid water at the commencement of the hot stage, or its effects may always be moderated by moistening the palms of the hands and soles of the feet with vinegar or cold water; it should always be resorted to, when the burning heat mentioned above is present; it is not only perfectly safe, but highly refreshing. In the third stage, should the above plan not be adopted in time, and diarrhœa has made its appearance, the gentle emetics before mentioned are recommended to be administered, provided the strength of the patient is not too much exhausted; mild astringements should at the same time be employed, as the decoction of hartshorn, or logwood, angustura, colomba, kino, and mucilaginous demulcent liquors, combined with opiates and absorbents. During the inflammatory period of phthisis, a vegetable diet, with milk, is indispensably requisite; souins, sago, barley, and rice, afford an agreeable variety; the lichen islandicus is strongly recommended, and is deserving of a trial; the ripe subacid fruits may be indulged in at pleasure, attention must, however, be paid to the state of the bowels: oysters, muscles, craw-fish, lobsters, and the testacea in general, also flounders and whitings, may be allowed occasionally, provided they do not disagree with the stomach, and do not aggravate the symptoms. In the advanced periods, when the hectic is completely formed, a small portion of animal food may be taken for an early dinner, if it does not greatly increase the heat, and when the appetite becomes voracious, which it sometimes does towards the fatal termination, small quantities should be taken frequently: the drink, in almost every period of the disease, should consist of toast and water, Malvern water, milk and water, butter-milk, rice water, or the juice of ripe subacid fruits mixed with water, and occasionally lemonade. Wine, spirits and fermented liquors of all kinds must be strictly prohibited, and the practice of mixing rum and other spirits with milk cannot be too strongly reprobated; where, however, there is but little increased excitement, and the pain is inconsiderable, a more nourishing diet and a moderate quantity of wine may be allowed, but the wine should be more or less diluted with water, and in the purulent stage, an invigorating diet always affords more or less relief. During the whole course of the disease, every irregularity and all crowded places must be studiously avoided; the patient should be advised to repair to Bristol in the early part of the disease, and should make use of such exercise as his strength will bear, as swinging, gestation in a carriage, or riding on horseback in progressive journeys, or the alternation of this last exercise and gestation in a carriage, but a sea voyage is the most effectual of all kinds of gestation: the patient must by all means avoid the piercing north-east winds in this country; it will, therefore, be advisable for him to visit a temperate southern climate during the winter and spring: the patient should be advised to lie on a hair mattress, with slight coverings over his body, and should be earnestly requested to go to bed early, and to get up soon in the morning, even if obliged, through debility, to lie down in the course of the day: the feet should be kept dry and warm, and the patient should wear flannel or cotton next to his skin; the former, however, is far more salutary: in the florid consumption, an elevated and inland air is often of the most essential service. Should we be so fortunate as to subdue this too fatal disease by the means recommended above, it will be indispensably requisite for the patient to persevere in employing the regimen recommended in the treatment of this complaint, for a considerable length of time after every symptom of the disease has disappeared, and he must return to his former manner of living with the utmost caution; the diet should, however, be light and nourishing, and in moderate quantity: the patient should breathe a pure dry air, and should take such exercise, particularly on horseback, as he can bear without fatigue, and should use the warm bath; and when the constitution can be brought to bear it he may employ the cold bath or sea-bathing.

ORDER V.

*Profluvia.* Insanguineous fluxes.—These are ordinally characterised as consisting of pyrexy with an increased secretion, naturally void of blood. The genera are two. 1. *Catarrhus*; Catarrh. 2. *Dysenteria*; Dysentery. This order might easily be suppressed; and the genera it comprises transferred to other situations to which they more properly belong, even under the present nosology. Catarrh is described as possessing pyrexy; fre-

quently contagious; an increased secretion of mucus, or at least efforts to excrete it. Dysentery, as evincing contagious pyrexy; frequent mucus or bloody stools; while the alvine feces are for the most part retained; gripes; tenesmus.

*Catarrh* will be distinguished from the measles, by the greater mildness of the febrile symptoms, by the state of the eyes, by the absence of coma and many of the symptoms accompanying the eruptive fever of measles.

This disease is rarely attended with danger, except there is great difficulty of breathing, attended with a livid and bloated countenance, or has been treated with negligence or impropriety, in which case, it often passes into pneumonic inflammation, attended with symptoms of the utmost danger; in general, however, it is a slight and safe disease, unless it attacks persons of a phthisical habit, or those advanced in life; in the former it may occasion phthisis, and in the latter, peripneumonia notha.

For its *cure*, nothing more is requisite, in general, than abstinence from animal food for a few days, keeping the body warm, and drinking freely of tepid mucilaginous diluents; if there is, however, a considerable degree of excitement, blood-letting will be necessary, but it must be employed with some degree of caution, as it is frequently succeeded by depression of strength, particularly when catarrh is epidemic; if there be much oppression and tightness about the chest, occasioning a degree of dyspnœa, local blood-letting will be advisable, and blisters must be applied to the sternum and scrobiculus cordis; gentle laxatives should be ordered; the patient should take copious draughts of some mucilaginous acidulated liquids; a gentle diaphoresis should be promoted by nauseating doses of tartar emetic, with spirit of mindererus, or by exhibiting the volatile alkali in wine whey; the vapour of warm water, impregnated with vinegar, should be frequently inhaled; mucilaginous oily demulcents should be given, and expectoration should be promoted by the means pointed out when treating of pneumonic inflammation: if the cough remains troublesome, after we have subdued the inflammatory diathesis, opiates, combined with the tartar emetic, or with ipecacuanha, may be employed with safety and advantage: rubbing the nose externally with oil, some ointment, or, with what is most commonly employed, warm tallow, is very often of great service, when the mucus membrane of the nose is much affected, which practice has very frequently come under my observation. In the treatment of the epidemic catarrh (influenza), as being frequently attended with a considerable degree of debility, the antiphlogistic regimen must not be pushed too far, even though there may be some appearance of excitement; it will, in general, if blood-letting should be deemed necessary, be more advisable rather to trust to local than to general blood-letting, blisters, mild diaphoretics, and diluents; sometimes, however, a more liberal diet, and the moderate use of wine, will answer better. Might not the affusion of tepid, or even cold water, be employed with safety, if the heat of the surface is greater than natural, and there is at the same time no tendency to asthma or phthisis pulmonalis?

*Dysentery* is most commonly preceded by costiveness, unusual flatulence, acid eructations, and wandering pains in the bowels; in most cases, however, from the commencement, griping pains are felt in the lower part of the abdomen, which often arise to a considerable degree of severity: the bowels are irritated to frequent evacuation, in indulging which, but little is voided, and the rectum often becomes exquisitely painful and tender; the matter evacuated is often very fetid, and the stools are frequently composed of mucus, pus, blood, membranous films, and white lumps of a sebaceous nature; the mucus is generally mixed with a watery fluid, and is often frothy: tenesmus, in a greater or less degree, generally accompanies the evacuation of the bowels, and it very rarely happens that the natural fæces appear, during the whole course of the disease, and when they do, they are in the form of scybalæ, that is, small separate balls, which appear to have lain long in the cells of the colon; when these are voided, either by the efforts of nature, or as solicited by medicine, they procure a remission of all the symptoms, more especially of the frequent stools, griping, and tenesmus; with these symptoms there is loss of appetite, great anxiety about the præcordia, frequent sickness, nausea, vomiting, and the matter rejected is frequently bilious, watchfulness, and prostration of strength: there is always some degree of symptomatic fever, which is sometimes of the remittent or intermittent type; sometimes it assumes the synochous, and very frequently the typhous, type: the tongue is white, and covered with tough mucus, or rough, dry, and sometimes black; the patient complains of a bitter taste in the mouth, and in the advanced stage of the disease there is hiccup, and aphthæ. If the small intestines only are affected, the pain is described to be most acute and excruciating about the umbilicus, the bowels are not evacuated immediately after the griping pains, the blood is mixed intimately with the fæces, and the sickness, vomiting, and pain at the stomach, are more urgent; if the large intestines are the seat of the disease, the pain is more obtuse, not so constant, is more distant from the umbilicus, and is more immediately followed by stools, and the purulent matter or blood, if there is any, is less mixed with the rest of the excrements, or only floats upon them, and there is more sickness than griping; but it frequently happens, that both the large and small intestines are affected, which renders it very difficult to determine, with any certainty, the seat of the disease.

The remote causes are, cold alternating with heat, derangement of the primæ viæ, and contagion. The proximate cause is supposed to be a preternatural constriction of the intestines, more particularly of the colon.

This disease will be readily distinguished from diarrhœa, by the absence, or less degree of fever in the latter; the less degree of griping and tenesmus, the appearance of the stools, and the other symptoms in diarrhœa will further assist us.

*Treatment*.—When the patient is of a robust and plethoric habit, and the disease is attended with acute pain in the bowels, with a strong full pulse, blood-letting will be necessary, but it must be practised with caution, especially in warm climates, where the employment of powerful antiphlogistic measures is often succeeded by a sudden and dangerous degree of debility; gentle emetics should be administered, they are not only useful in emptying the primæ viæ, but they also determine to the skin; they will be more efficacious when given in such small and repeated doses as not to excite immediate vomiting, unless the oppression at the stomach is urgent; the emetics generally employed in dysentery are ipecacuanha and tartar emetic, and, at the early periods of the disease, they will be more efficacious when combined: the morbid and noxious contents of the intestines, the most

pernicious source of irritation in dysentery, must be expelled by cathartics; those most generally celebrated are the ipecacuanha and tartar emetic, the former is, however, most frequently employed; it may be given either alone, or in combination with the crystals of tartar, in such doses as will produce some degree of nausea, and repeated when the nausea abates; the calomel is an excellent remedy where there is a tendency to inflammation, but it should never be given alone; its operation is rendered both more easy and certain, by combining it with other cathartics; the most effectual remedy, however, in general, is a simple solution of Epsom salts, or Glauber's, or it may be given in a diluted infusion of senna, with a considerable proportion of manna; the cream of tartar with tamarinds, the phosphat of soda, and castor oil, will make an useful variety; after the operation of the cathartic is finished, it will be advisable to administer opiates, and they will be more efficacious if given with nauseating doses of emetics; the pulvis ipecacuanhæ compositus is a good medicine; the hyoscyamus, by its anodyne and gently laxative qualities, seems eminently adapted to this disease. The warm bath is often used with advantage; fomentation of the abdomen is more frequently serviceable, but the most effectual remedy is a large blister applied over the abdomen; in mild cases, however, so severe a remedy is not necessary; the addition of strong peppers to the fomentations may, in such cases, answer our intentions: the pain attending the tenesmus will be allayed by fomenting the anus with hot water, or with a decoction of chamomile flowers, with some tinctura opii sprinkled on the stupes: strangury is not an uncommon symptom; independent of cantharides, it will be effectually relieved by fomenting the pubes and perinæum: mucilaginous demulcent liquids must be given freely, for the purpose of defending the intestines against the acrimony of their contents, and mucilaginous and oily clysters should be employed once or twice a day, or more; they are very serviceable for the same intention as the mucilaginous liquids, and act also as a fomentation; they should consist of a strong decoction of linseed or starch, or they may be composed of milk and oil, united by means of mucilage. In the advanced and chronic stage of the disease, as acidity of the stomach chiefly prevails at that period, absorbents will be useful, as the mistura cretacea, aqua calcis, pulvis cretæ compositus, &c. combined with opiates; astringents will also, at this period of the disease, be proper, as the kino, hæmatoxylum, catechu, &c. and if the powers of the stomach are much weakened, they may be combined with chalybeates. The tone of the bowels will be restored, by administering quassia, bark, angustura, or colombo; an infusion of gentian and cinnamon in port wine is recommended; it will always be advisable to join aromatics with bitters: a purgative of the calomel and rhubarb should be given from time to time in this form of the disease, and when it remains obstinate, we may always suspect visceral obstruction; should this, upon examination, be the case, mercury, either internally, or by friction, should be employed until some sensible effect is produced in the mouth. The diet in the first stage should consist of milk, sago, panada, salep, Indian arrow-root (maranta arundinacea), and rice, the quantity being regulated by the appetite; the sweet and subacid fruits may be allowed, and they are particularly serviceable when there is much bile in the primæ viæ; in the more advanced stages, the ripe fruits are condemned, but it does not, however, appear, on sufficient grounds, that they should be so; together with the farinacea, a small quantity of animal food may be allowed in the chronic state of the disease, provided it does not disagree with the patient. The drink at the commencement should be either barley or rice water, boiling water poured upon toasted bread or burnt biscuit, whey, or the decoction of hartshorn, and the like; in the advanced stage of the disease, port wine or madeira, or a moderate quantity of spirits diluted with water, will be proper; the patient should wear flannel next to the skin for some time after the disease is gone off, and should take as much exercise as he can bear without fatigue, either on horse-back or in a carriage, carefully avoiding exposure to cold or moisture. The powder or extract of nux vomica is strongly recommended by Dr. Hufeland, in doses of from six to ten grains of the powder, three times a day; or one or two grains of the extract may be given every two or three hours; three or four grains or more may be given in clysters: children of one year old may take from one to two grains of the extract in the twenty-four hours; it is necessary to observe, that the medicine is directed to be administered in some mucilaginous mixture. It is of consequence to warn the young practitioner, in the most forcible manner, against employing opiates at the beginning of the disease, unless a free evacuation of the bowels has been procured by cathartics, and the excitement much diminished, as they generally aggravate the disease; and it will always be pernicious to give them without nauseating doses or emetics, while the griping pains remain; the hyoscyamus, if anodynes are deemed requisite, is preferable to opium, in consequence of its possessing a gently laxative quality.

### CLASS II.

*Neuroses.*

This class of diseases is characterised by an injury of the sense and motion, with an idiopathic pyrexy, or some local affection. It comprises the following orders.

#### Order I.

*Comata.*—Stupors implying a diminution of voluntary motion with sleep, or insensibility. Including the following genera. 1. *Apoplexia;* apoplexy, which is either idiopathic or symptomatic, and is described thus: almost all voluntary motion diminished, with sleep more or less profound; the motion of the heart and arteries remaining. 2. *Paralysis;* Palsy, only some of the voluntary motions diminished, frequently with sleep. These also are either idiopathic or symptomatic; the species are asthenic; paralytic; convulsive.

*Apoplexy.*—The symptoms are so well known that they need not to be repeated. Dr. Baillie remarks very justly that "when the patient is not cut off at once, but lives for some time after the attack, the hemiplegia, which is almost constantly an effect of this disease, is upon the opposite side of the body from that of the brain, in which the effusion of blood has taken place: this, the learned author observes, would seem to shew, that the right side of the body derives its nervous influence from the left side of the brain, and the left side of the body, its nervous influence from the right side of the brain." This disease is observed to make its attacks most frequently about the period of the equinoxes.

The predisposing causes are, a declension from the meridian of life, a large head, a short neck, the sanguine or phlegmatic temperament, obesity,

an indolent life, or one too much devoted to study, too long sleeping, high living, indulgence in spirituous liquors, the gout, and the suppression or cessation of the hæmorrhoidal, or any other habitual hæmorrhage or evacuation. The exciting causes are, violent exercise, as dancing after too great repletion of the stomach, a full and long continued inspiration, too strong exertions of the mind, every passion which agitates the human frame, great external heat, especially from a crowded room, intemperance, warm bathing, crudities in the primæ viæ, violent emetics, the spring season, rapid alternations of heat and cold, too great indulgence in smoking tobacco, long stooping with the head down, tight ligatures about the neck, over distension of the blood vessels of the brain or its membranes, an effusion or extravasation of blood or serum into the substance of the brain or its ventricles, fractures of the scull or depression of it, causing an effusion of blood upon the brain or its meninges, and tumours within the cranium. The proximate cause is supposed to be whatever interrupts the motion of the nervous power from the brain to the muscles of voluntary motion. Difficulty of swallowing, and the regurgitation of the drink through the nostrils, great difficulty of breathing, and foaming at the mouth, are symptoms of the most imminent danger, but the prognosis may be generally collected from the violence of the attack, profoundness of the sleep, stertorous breathing and degree of the affection of the respiration, and of the powers of sense and of motion: the first attack of this disease is not commonly fatal, particularly if the patient is not cut off in the course of the first week, it frequently terminates favourably either by diarrhœa, hæmorrhage, return of the hæmorrhoidal, or any other habitual discharge, and sometimes by the appearance of fever.

*Treatment.*—As this disease arises in consequence of an effusion of blood or serum into the ventricles of the brain, or upon its meninges, blood-letting in a moderate degree may be of service, but copious bleedings must be injurious, by weakening the patient, and preventing the absorption of the effused fluid; the blood should be taken from the temporal artery, or the jugular vein, and if that cannot conveniently be done, it may be taken from the arm; if one side is more affected than the other, the blood should be taken from the side least affected; cupping the occiput is often serviceable, and it does not reduce the patient's strength so much as general blood-letting; warm fomentations of the shaved head continued for a length of time, and frequently repeated, will be of service; an emetic is recommended to be administered, but, in my opinion, it is at least a doubtful remedy, unless the patient is affected with nausea in consequence of repletion of the stomach; acrid cathartics, as aloes, resin of jalap, calomel combined with the scammony, or with the extract of colocynth, &c. should be given by the mouth, if the power of swallowing remains, and clysters, composed of a solution of some of the above cathartics, and the oleum succini, should be injected; blisters should be applied to the head, spine, and extremities, or a large caustic should be applied to the neck, and mustard cataplasms to the feet: the patient should be kept cool, and as much in an erect posture as he can bear without inconvenience; small electric shocks should be sent through the head; errhines and acrid volatile medicines are recommended, but they appear at least doubtful remedies: if the disease appears to be the consequence of the suppression of the hæmorrhois, leeches should be applied to the hæmorrhoidal veins, fomentations must be employed, and the intestines must be stimulated by means of aloetic cathartics. The strength of the system will be restored by the cinchona, bitters, and chalybeates. The return of this disease is to be prevented by studiously avoiding all the remote causes which are in our power; a plethoric state of the blood-vessels of the brain must be obviated by a low diet, abstinence from fermented or spirituous liquors, moderate exercise, as riding on horseback, if not affected with frequent fits of giddiness, or by walking; costiveness must be prevented by gentle cathartics, and if the disease had arisen from the suppression of the hæmorrhoidal flux, aloetic purgatives will be most suitable; an issue or seton should be made as near as possible to the head, or, as being less disagreeable, a thin slice of the fresh root of the daphne mezereum, steeped in vinegar for twenty-four hours, may be applied daily, and if the inflammation should be very considerable and the discharge profuse, it may be left off for a few days, and the parts should be kept moistened with a solution of sugar of lead.

In *Palsy*, many of the symptoms have a resemblance to those of apoplexy. It will be distinguished from apoplexy, however, by the pulse, which, in this disease, is slow and soft, and by the other symptoms. If it arise from the causes producing apoplexy, it must necessarily be treated in the manner just recommended; when the apoplectic symptoms are removed, and hemiplegia or paralysis only remains, or when it arises from diminished energy of the nervous system, it will be proper to prescribe internal and external stimulants; of the former class are, white mustard seeds, slightly bruised or swallowed whole, in the quantity of a large table-spoonful, three or four times a day, or horse-radish scraped, a table spoonful of which may be swallowed without chewing, night and morning, or they may be combined and made into an infusion, by macerating two ounces of each in a quart of boiling water for four hours, and adding two ounces of the spiritus pimento to the strained liquor, of which two or three ounces may be given three or four times a day; the arnica montana is strongly recommended; the volatile alkali is often of service, and sumach is deserving a trial, from half a grain to three or four grains or more of the dried leaves are directed to be given two or three times a day: of the latter class of stimulants are, blisters, friction of the parts affected with mustard, æther, volatile alkali, linimentum ammoniæ fortius, or the oleum terebinthinæ, combined with the oleum succini and tincture of cantharides; stinging with nettles, and electricity, both sparks and shocks will be of considerable service, particularly if employed early in the disease; flannel must be worn next the skin, warm sea-bathing, and friction with flannel or the flesh-brush, will be useful auxiliaries. If the disease appear to have arisen in consequence of intemperance, the liver will most probably be found to be more or less in a diseased state, which will be known by referring to the diagnostic remarks, in the article DIETETICS, in which case, some of the preparations of mercury may be given with much advantage, employing afterwards bitters, bark and chalybeates: the diet should be light, nourishing, and stimulating. The Bath waters are very serviceable, both by the mouth and as a bath, particularly so if the disease has arisen from intem-

perance, or the colica pictonum; should there, however, be a constitutional determination to the head, we must strictly attend to the effects which the Bath waters produce upon the system, as they may suddenly induce much mischief.

### Order II.

*Adynamiæ.* Defective powers.—This title is inexplicit, as being equally applicable to a variety of other orders as well as to the present. The order is characterised thus: a diminution of the involuntary motions whether vital or natural.

The genera are, 1. *Syncope*, or fainting; a diminution, or, for a short time, a total stoppage of the motion of the heart. It is either idiopathic or symptomatic. 2. *Dispepsia*, or indigestion. Anorexy, nausea, vomiting, inflation, belching, rumination, heart-burn, pain in the stomach; more or less of these symptoms at least concurring; for the most part with a constipation of the belly, and without any other disease either of the stomach itself or of any other parts. 3. *Hypocondriasis.* Indigestion with languor, sadness, and fear, without any adequate causes, in a melancholy temperament. 4. *Chlorosis.* Green-sickness. Dyspepsy, or a desire of something not used as food; a pale or discoloured complexion; the veins not well filled; a soft tumour of the whole body; debility; palpitation; suppression of menstruation.

It is obvious that the genera of this order relate, for the most part, either to those which belong naturally to the tribe of diseases of indigestion, and have already been treated by us under the article Dietetics, or else are catenated with peculiar states of the female frame, and as such fall naturally into the article Midwifery, and will be noticed under that term.

### Order III.

*Spasmi.* Spasms.—Irregular motions of the muscles or muscular fibres. This definition, however, does not sufficiently distinguish this order from some of the species of *syncope*, which ranges under the last. It is a very numerous family, divided into two sections.

A. In the animal functions. 1. *Tetanus:* a spastic cramp or rigidity of almost the whole body; varying according to the remote cause, as it arises either from something internal, from cold, or from a wound; or according to the part of the body affected, be the cause what it may. 2. *Trismus;* a spastic rigidity of the lower jaw: two species, the first seizing infants: the second, seizing persons of all ages from a wound or cold. 3. *Convulsio*; convulsions, commonly so called. An irregular cronic contraction of the muscles without sleep. Idiopathic, and symptomatic. 4. *Chorea*; St. Vitus's dance: attacking those who have not yet arrived at puberty, most commonly within the tenth and fourteenth year, with convulsive motions for the most part in attempting the voluntary motion of the hands and arms, resembling the gesticulations of mountebanks; in walking, appearing to drag rather than to lift one of the feet after the body. 5. *Raphania;* a spastic contraction of the joints with a convulsive agitation, and most violent periodical pain. 6. *Epilepsia*; epilepsy, a convulsion of the muscles with sleep. From various causes and of various species: cerebral, sympathetic, occasional; as proceeding from injuries of the head; pain; worms; poison; from repulsion of the itch, or an affusion of any other acrid humour; from crudities in the stomach; from passions of the mind; from an immoderate hæmorrhage; or from debility. 7. *Palpitatio;* palpitation. A violent and irregular motion of the heart. 8. *Asthma*; a difficulty of breathing returning by intervals: with a sense of straitness in the breast, and a noisy respiration with hissing. In the beginning of the paroxysm no cough, or the coughing difficult; but the cough free towards the close, frequently with a copious spitting of mucus. Three species; spontaneous; from eruptive fevers; from plethora. 9. *Dyspnæa*; impeded respiration. A continual difficulty of breathing, without any sense of straitness, but rather of fulness and infarction in the breast; a frequent cough throughout the whole coure of the disease. Eight idiopathic species; three symptomatic, accompanying diseases of the heart, a swelling in the abdomen; various maladies. 10. *Pertussis*; hooping cough. A contagious disease; convulsive strangulating cough reiterated with noisy inspiration; frequent vomiting. 11. *Pyrosis*; water-brash. A burning pain in the epigastrium, with plenty of aqueous humour, for the most part insipid, but sometimes acrid, belched up. 12. *Colica*; colic. Pain of the belly, especially twisting round the navel; vomiting; a constipation. Numerous species, varying according to the nature of the remote cause; and hence proceeding, *a* from metallic poisons; *b* from acids taken inwardly; *c* from cold; *d* from a contusion of the back; *e* from costive habit; *f* from retained meconium. 13. *Cholera*; iliac passion. A vomiting of bilious matter, and frequent excretion of it by stool; anxiety; gripes; spasms in the calves of the legs. Two species: the one arising in a warm season without any manifest cause; the other from acrid matters taken inwardly. 14. *Diarrhœa*; looseness. Frequent stools; the disease not infectious; no primary pyrexy. The species are, crapulous, or from excess of eating; bilious; mucous; cæliac, discharging a chyle-like secretion; lienteric, in which the aliments are discharged with little or no change; atrabiliary. Of these several have been already noticed in the article Dietetics. 15. *Diabetes*; a chronical profusion of urine, for the most part preternatural, and in immoderate quantity. Two species, D. mellitus, with urine of the smell, colour, and taste of honey. D. insipidus; limpid, but not sweet urine. 16. *Hysteria*; hysterics. Rumbling of the bowels; a sensation as of a globe turning itself in the belly, ascending to the stomach and fauces, and then threatening suffocation; sleep; convulsions; a large flow of limpid urine; the mind involuntarily mutable and fickle. Almost all the varieties of this disease proceed from irregularity in the female sexual organs, and will be found described under the article Midwifery. 17. *Hydrophobia*; a dislike and horror at any kind of drink, as occasioning a convulsion of the pharynx; induced for the most part by the bite of a mad animal. The species are, rabid hydrophobia, from the bite of a mad animal, the desire to bite being propagated; and simple hydrophobia, without madness, or any desire of biting. This genus is equally misnamed, misplaced, and misdescribed.

We can only offer a few observations upon such of this family of diseases as are of most importance from their danger, or frequency of appearance.

*Tetanus. Trismus.* Locked jaw. The two species denominated by these names are in reality the same disease, varying only in extent. Tetanus sometimes comes on suddenly, more generally, however, a sense of stiffness, or slight twitchings, at first perceived in the neck; these gradually increasing, the motion of the head becomes dif-

ficult and painful; as the rigidity of the neck becomes more considerable, a sense of uneasiness is felt about the root of the tongue, which, by degrees, produces a difficulty or inability of swallowing; there is violent pain under the ensiform cartilage, which shoots to the back; when this pain arises, the muscles, particularly of the back part of the neck, are immediately affected with spasm, pulling the head strongly backwards, at the same time the muscles of the lower jaw become rigidly contracted, so that the teeth are firmly closed together; as the disease advances, the muscles of the whole spine are affected, and draw the body backwards, producing opisthotonos; at other times the muscles of the fore part of the body are affected, and emprosthotonos is the consequence; and when the antagonist muscles of the whole body are so contracted that the patient can bend himself in no direction, but remains as stiff as the trunk of a tree, the disease is called tetanus, which is, however, not so common a form of the disease as the one we are now giving a description of; the abdominal muscles become violently affected with spasm, so that the belly is strongly retracted; at length the whole of the muscles of the head, trunk, and extremities, become strongly affected, and the body is rigidly extended, as above described; the tongue is often partially attacked with spasm, and is often thrust out violently between the teeth; at the height of the disease, every organ of voluntary motion suffers, in a greater or less degree, and in particular the muscles of the face; the forehead is drawn up into furrows, the eyes are hollow, distorted, rigid, and immoveable, the nose is drawn upwards, and the cheeks are drawn backwards towards the ears, so that the whole countenance expresses a most ghastly appearance, and in this state violent convulsions supervene, and put an end to life. The spasms are attended with violent pain, and generally last for a minute or two, and as the disease advances they are often renewed every quarter of an hour, and sometimes terminate in general convulsions; there is seldom any fever, but when the spasms are violent, the pulse is contracted, hurried, and irregular, and the respiration is alike affected, and there is sometimes an interruption of the breathing and convulsive hiccup; in the remissions, the pulse and respiration are natural, the heat of the body is commonly not increased, the face is generally pale, with a cold sweat upon it; the extremities are generally cold, and there is frequently a cold sweat over the whole body; sometimes, however, when the spasms are very frequent and violent, the pulse becomes full and frequent, the face is flushed, and a warm sweat is diffused over the whole body: it is a very remarkable circumstance, that neither the mental nor natural functions are considerably affected; there is seldom delirium, or confusion of thought, the appetite remains good, the urine is sometimes suppressed, or is voided with difficulty and pain, and there is costiveness. It is remarked by Dr. Blane, that the convulsive twitchings are sometimes accompanied with pleasure.

This disease often proves fatal before the fourth day; after that period there is generally less danger, but, although there may be some abatement of its violence, it is apt to return with renovated force; a favourable termination of it is sometimes attended with a sensation of stupor, or formicatio, and a sense of itching, more frequently, however, it goes off, without any evident crisis; the danger will, therefore, be determined by the violence of the attack, and frequent recurrence of the spasms, and general convulsions.

The removal of this disease must be attempted by administering opium in moderate but frequent doses, and where the deglutition is performed with any difficulty, it should be thrown in by clyster; wine is a most valuable auxiliary, but it should be taken in large quantities, and it will be more serviceable when given in combination with opium; the cinchona is recommended, but it does not appear to have answered the sanguine expectations that were to be wished for; mercury is often of service, provided it is pushed so far as to affect the mouth; the warm bath, or a bath composed of milk or oil, has been recommended, and has sometimes succeeded, when employed in combination with opium, the heat of the bath is ordered to be lowered or raised, so as to afford the sensation of gentle and comfortable warmth; the most powerful remedy, however, appears to be immersion in the cold bath, in the paroxysm of convulsion, taking care to have some warm blankets in readiness, and immediately the patient is taken out of the bath he should be well rubbed with warm flannels, and put to bed; opiate frictions are particularly recommended, as the medicine can, in this way, be introduced into the system more readily, and without increasing the frequency of the spasms, which frequently occur during the efforts of deglutition; the combination of opium with æther is also of great service; the diet should consist of milk and broths, and if the nourishment cannot be received by the mouth, it should be thrown up by clyster. If the disease has arisen in consequence of the partial division of a nerve, it should be cut through, and if from a wound, it should be dilated, and filled with stimulating applications, as lint, moistened with the oleum terebinthinæ, and we must avoid exposure of the part to a current of cold air: the pain under the ensiform cartilage, and the spasms in general, will most commonly be relieved by applying cloths dipped in æther, and by gentle and uniform pressure on the parts suffering from spasm, by means of bandages, on which the æther should be poured occasionally, guarding, however, against the cold produced by the too speedy evaporation of the æther. The trismus of infants is a disease most frequent in warm climates; it generally attacks infants, within the first fortnight after birth, more frequently, however, before they are nine days old; as it, in our opinion, very frequently proceeds from a retension of the meconium in the primæ viæ, it will be highly proper, in the first instance, to exhibit gentle laxatives, afterwards wine and antispasmodics, and if we do not succeed by these means, it will be advisable to try the cold bath, and the remedies above recommended.

*Epilepsy* may be distinguished from other species of convulsions by the sopor, and by the abolition of the sensation of external impressions; from apoplexy, by the increased action of the muscles; from hysteria, by the absence of the globus hystericus, and by its not being attended with the fear of death. The symptomatic epilepsy is more easily cured than the idiopathic; the later in life epileptic fits are experienced, the more dangerous they may, in general, be esteemed, as the cause may be supposed to have been acquired by the patient's habits of life, or by the decay of some internal part: hereditary epilepsy is scarcely ever cured; the longer the continuance of the complaint has been, and the more violent and frequent the convulsions are, the more dangerous is the disease, particularly if the vital functions are much affected; sometimes, although not very fre-

quently, a single violent paroxysm cuts off the patient: epilepsy sometimes goes off at the age of puberty, or on the appearance of the menses; an intermittent fever, or a cutaneous eruption, often removes the disease.

*Treatment.*—Blood-letting will sometimes be of service in the paroxysm, if the disease has not been of long continuance, and the patient is in a plethoric state; in general, however, it is more advisable not to take away blood, but to trust to less debilitating remedies: immediately the patient is attacked with a fit, we must endeavour, as far as possible, to prevent his receiving any injury from the violent agitation of his body; he ought, therefore, to be put into a bed, with his head raised, and to have any pressure, occasioned by ligatures about his neck, instantly removed; stimulants should be applied to the nostrils, as errhines, or volatiles, as the spiritus ammoniæ compositus, the spiritus ammoniæ succinatus, &c. and the spine should be rubbed with the æther, or with the linimentum ammoniæ fortius, or oil of turpentine, and they will be more serviceable, if combined with stimulants, as the oil of amber, or the tincture of cantharides; it will be proper to administer opiates, and other antispasmodics, by clyster, particularly musk, and valerian. In the intermissions we are to attempt the radical cure of the disease; when the disease is symptomatic of some primary affection, we must, by a particular attention to the attending symptoms, endeavour to discover the nature of that affection; and if we succeed in removing the primary affection, by the proper means adapted to its cause, the epileptic attacks will cease of course; the aura epileptica has been removed by a tight bandage being made round the limb, just above the part from which that sensation appears to proceed; we must direct the patient to carefully avoid the occasional causes which are within his reach, and the predisposition must be corrected, as far as lies in our power. When the disease is idiopathic, and appears to depend upon a plethoric state of the system, that must be removed or prevented by moderate exercise, an abstemious diet, and issues, or setons: if the disease appear to arise from any suppressed discharge, in particular the hæmorrhois, leeches should be applied to the hæmorrhoidal vessels, fomentations should be employed, and we should, at the same time, administer aloetic cathartics; after the plethoric state of the system is removed, the cure of the disease will be effected by antispasmodics: when the disease seems to arise in consequence of a debilitated state of the system, it must be strengthened by cold-bathing, exercise, change of air, a nourishing diet, tonics, and antispasmodics; the most suitable tonics are bark, oxyd of arsenic, ammoniate of copper, sulphat of copper, oxyd of zinc, and chalybeates: the antispasmodics in most general use are, oil of cajeput (melaleuca leucadendron), æther, musk, digitalis, stramonium, belladonna or hyoscyamus, lunar caustic, and opium, which last is most assuredly the best and most efficacious antispasmodic; it should be administered in doses, proportioned to the age and constitution of the patient, a short time before the expected return of the paroxysm; the opium must be repeated at proper intervals, and it will be necessary to increase the dose in a gradual manner, in proportion to the violence or frequent recurrence of the fits: whatever antispasmodic is employed, it will be indispensably requisite never to allow its effects to cease on the system, and to continue its use for months, or even a year or two after the violence of the disease is overcome, and the fits have ceased, in order to establish a new habit in the system, and it should on no account be left off all at once, but the dose should be gradually diminished, as the fits are very apt to return, on the discontinuance of the medicine, with increased violence and danger: it will not be improper to remark, that antispasmodics are employed with most advantage, a short time previous to the expected recurrence of the paroxysm, and when the fits recur during sleep, a full dose of an opiate should be given at bed-time; the application of a cataplasm, formed chiefly of tobacco, to the scrobiculus cordis, about half an hour before the expected return of the paroxysm, has sometimes prevented it, and this practice, repeated several successive days, at the expected periods, has destroyed the diseased catenation, and effected a permanent cure: if the disease appears to arise from sympathy, some instrument of terror should be kept in readiness, as the actual cautery, or something that will inspire horror, which will very frequently prevent the fits: should derangement of the primæ viæ, worms, dentition, or any other obvious exciting cause, be the means of occasioning the disease, it must be removed by laxatives, and other remedies adapted to its causes, and as the disease so frequently, in part, arises from the first mentioned cause, occasional emetics and gentle cathartics will be proper, in order to obviate any accumulation of irritating matter in the stomach and intestines: when the disease proves obstinate, especially in those who are advanced in life, or have been intemperate in the use of fermented, spirituous, or distilled liquors, we have every reason to suspect some derangement in the hepatic system; in which case it will be requisite to employ the hydrargyrus, to a greater or less extent, in proportion to its effects on the disease, and it will, if the patient is not in a very debilitated state, sometimes be of essential service to push the mercury so far as to affect the mouth. A total change of habit and climate may also frequently be prescribed with great benefit.

*Asthma.*—The paroxysms of this disease very frequently commence during or after the first sleep, with a sense of tightness and stricture across the chest, and a feeling of uneasy oppression in the lungs, impeding respiration; there is either no cough present, or it is not attended with any expectoration: the patient, if in a horizontal situation, is immediately under the necessity of getting into an erect posture, and of flying for relief to the open window; the difficulty of breathing for a time increases, and both inspiration and expiration are attended with a wheezing noise, the voice is weak, and the exertion of talking is more or less painful: after these symptoms have continued for some hours, a profuse sweat sometimes breaks out, the breathing becomes less laborious, and the cough, which, at the commencement, was not present, or was without any expectoration, now becomes more free, and a more or less copious secretion of mucus takes place, and the other symptoms abate, but there is a greater or less degree of tightness across the chest, and of difficulty of breathing, throughout the course of the day; towards evening, or about midnight, for several successive nights, the symptoms suffer an exacerbation, and a remission takes place towards morning; and after some days, on the expectoration becoming and continuing more copious, the paroxysms for a time cease altogether: the pulse is,

for the most part, quick, weak, and small, and the urine, which, at the commencement of the paroxysm, was pale, on its remission becomes high-coloured, and often deposits a sediment; the face is sometimes, during the paroxysm, somewhat flushed and turgid, more commonly, however, it is pale and shrunk: asthma is very frequently an hereditary disease; it does not very commonly appear before the time of puberty, and chiefly affects the male sex; it is most liable to return in hot weather, this, however, is not always the case: the paroxysm is often preceded by lassitude, torpor, drowsiness, a sense of weight or pain of the head, and symptoms of dyspepsia.

*Treatment.*—In the paroxysm, if the patient is young, and of a plethoric habit, blood-letting will be often of service, especially if employed in the early periods of the disease, but if it has been of long continuance, it is generally hurtful, but cupping between the shoulders is often of considerable service; gentle laxatives and clysters should be employed, at proper intervals, so as to keep the bowels regular; gentle emetics should on no account be dispensed with, and where a paroxysm is expected to occur in the course of the night, an emetic, exhibited in the evening, will generally prevent it: antispasmodics should be administered, as opium, asa-fœtida, æther, &c.; it will be necessary to assist and promote the expectoration by means of some of the following remedies, either alone, or perhaps a more preferable manner will be in combination, as milk of ammoniac or of asa-fœtida, the decoction of seneka, or a solution of spermaceti, with nauseating doses of tartar emetic, or with some of the preparations of squills; the carbonat of ammonia, and myrrh, are also medicines of considerable efficacy; but squills are, by far, the most valuable expectorant of any in the whole materia medica; a blister should be applied to the chest, the vapour of warm water should be inhaled, and its effects will be increased, if the water is impregnated with æther; warm pediluvia, or the warm bath should be ordered; the respiration of an atmosphere, mixed with hydrogen gass, or any other innocuous air, which might dilute the oxygenous gass, would be useful in spasmodic asthma, by decreasing the sensibility of the system, and preventing the recurrence of the paroxysms; the respiration of an atmosphere, with an increased proportion of oxygen, is recommended in what is called the humoral asthma: in the intermissions, the remote causes should, as far as lies in our power, be carefully avoided; the use of fermented liquors, and particularly of distilled spirits, must be strictly inhibited; the diet should be light, of easy digestion, not flatulent, and the food should be taken in moderate quantities, taking care not to oppress the stomach; but when the disease has been of long continuance, a more full diet may be allowed; riding on horseback, or in a carriage, and more particularly a sea-voyage, should, if convenient, be advised, or the patient should change the air, and try different situations, until, either by accident or by perseverance, he finds out a situation to live in, in which the disease is rendered less distressing, or is entirely removed; repeated blisters should be applied about the chest, or an issue be made in the neighbourhood: smoking tobacco is useful; and garlic or onions by way of sauce may be also found serviceable. Bark, chalybeates, and aloes, should be had recourse to towards the close of the paroxysm.

*Colic* commences with an acute pain over the abdomen; the navel is twisted towards the spine; and the muscles of the abdomen are spasmodically contracted into separate portions, giving it the appearance of a bag full of round balls; there is vomiting of a bilious matter, obstinate costiveness, and generally coldness of the extremities; the urine is high-coloured, is voided in small quantity, and with some degree of difficulty and pain: the disease is seldom attended with pyrexia; in the first instance, sometimes, however, an inflammation of that part of the intestine, where the disease is situated, supervenes, and aggravates the disease: when the peristaltic motion of the whole intestinal canal is inverted, the disease is called ileus, which is only to be regarded as a more violent degree of colic; it is, however, more apt to terminate in enteritis, or gangrene.

The *removal* of this disease will generally be effected by blood-letting, in the repetition of which we must be guided by the state of the pulse, violence of the attack, and strength of the patient; in all violent attacks of colic, if the patient is in tolerable vigour, it will not only be advisable but prudent to take away a moderate quantity of blood (except the disease arises in consequence of lead being received into the system), more particularly so, if the pulse is full or hard, and there are any symptoms denoting a tendency to enteritis, it will, at the same time, be the means of relaxing the spasm, and procuring stools: the warm bath should be ordered, or the abdomen should be fomented, and strong peppers and spirits may be added to the fomentations; friction of the abdomen with warm oil, or bags filled with hot sand, or bladders filled with hot water, may be employed also with great advantage; blisters or rubefacients, together with warm pediluvia, will be requisite; antispasmodics should be administered internally, and where the disease has not been preceded by long costiveness, opium will be the most efficacious remedy, especially if vomiting prevents the exhibition of cathartics: where, however, the disease has been preceded by costiveness, the hyoscyamus will be found to be a more suitable remedy, as along with its narcotic, it also possesses a gently cathartic quality: cathartics must be ordered, and they will be more efficacious when given in combination; calomel, above all, ought never to be given alone; its operation is always rendered more certain and easy by combining it with other cathartics, and the addition of a few drops of some essential oil will, in a great measure, obviate their griping effects; laxative clysters must be ordered; at first they should be mild, and tolerably large; the addition of a portion of oil, or of a solution of Epsom salts, will be an useful auxiliary. And if we do not succeed in procuring the evacuation of the intestines by the above means, we must have recourse to the injection of the smoke of tobacco, or a more certain and efficacious remedy is a decoction of tobacco, in the proportion of half a drachm to four ounces of water, to be thrown up as an enema; if all the above means prove of no avail, we must have recourse to mechanical dilatation, as, by administering one or two ounces of the hydrargyrus every hour or two, or a large quantity of warm water should be injected by means of a large syringe: when every purgative, and even all other means that are in most common use, have failed, the action of the intestines has sometimes been effectually excited by throwing cold water on the lower extremities.

The *Colica Pictonum* vel Saturnina, or Colic from Lead, differs from the species above described, in not coming on in so sudden and violent a manner, and also in its cause, that of lead taken into the

body, under various circumstances, as by exposure to the action of it, or by drinking cyder, or other liquors impregnated with it; the disease generally commences with slight uneasiness in the bowels, or with a sense of weight, or of an aching, rather than an acute pain, about the navel, which is increased after eating; the pain remits, and is sometimes relieved by pressure upon the abdomen; this, however, is frequently not the case; after a time the pain increases, becomes permanent, and intolerably excruciating; there is retraction of the umbilicus, the integuments of the abdomen and the intestines are violently contracted, and drawn towards the spine, and the spasms are often so obstinate that it is with the greatest difficulty a clyster can be thrown into the rectum; the pulse is hard and tense, there is obstinate costiveness, and often strangury; after several attacks paralysis comes on, chiefly of the upper extremities, although there are numerous cases recorded, in which the lower are affected also, and sometimes it terminates in swellings of the joints, and loss of sight; sometimes, but more rarely, the disease is succeeded by paralysis after the first attack; the patients cannot rest in bed for the violence of the disease, and they find relief in walking about, if they have sufficient strength; those who have once laboured under the disease, are very liable to relapse, in which case the disease comes on in a more violent manner than before, and the recovery is then more slow, and less complete. In the removal of this violent disease we must, in the first place, restore the intestines to their natural irritability, by the exhibition of a large dose of opium; we should then administer some cathartic medicine at proper intervals, as the sulphas magnesiæ vel sodæ, or the phosphas sodæ, dissolved in broth, or some aromatic fluid, castor or almond, may be given, combined with tincture of senna; and if the stomach is in a very irritable state, the medicines must be exhibited in the form of pills, for which purpose the calomel, joined with extract of jalap or colocynth, and a few drops of some essential oil, will be the most suitable; laxative clysters will be necessary, to which may be added some cathartic salt, or oil; the pain of the abdomen will be relieved by rubbing it with tepid oil, or by applying spiced fomentations, or by the warm bath, or by bags of hot sand, and similar antispasmodics; the application of a large blister to the abdomen is, however, a much more efficacious remedy; when we have relieved the urgent symptoms, the disease will, on its first attacks, be effectually removed by employing mercury internally and externally; mercury must be pushed so far as to occasion some affection of the mouth as soon as possible, and the system must be kept under the influence of mercury, in a greater or less degree, according to the violence of the disease, for two or three weeks after every symptom of the disease has disappeared, as it is very apt to return, and with increased force: as a disposition to costiveness often remains, it should be obviated by some of the above cathartics: it sometimes happens that the pain in the bowels shifts suddenly, and attacks the head, causing extreme misery; in this case nothing affords so much relief as blisters applied to the back, behind the ears, and to the temples, successively, according to the urgency or continuance of the pain; opiates may be administered at the same time with advantage. The paralytic affections, which are the consequence of this disease, and the ileus, will be removed by the internal and external employment of Bath waters.

In *Diabetes* the most prominent symptoms, according to Dr. Rollo, are voraciousness and keenness of appetite, or a frequent craving for food, without the feel of entire satiation; a parched mouth, with constant spitting of a thick viscid phlegm, of a mawkish, sweetish or bitterish taste; intense thirst; a whitish tongue, with red bright sides; red and swelled gums, with the teeth feeling as on edge from acids, and loose in their sockets; headach; a dry hot skin, with flushing of the face; a pulse most generally about eighty-four or six; an increase of clear urine, of a light straw colour, having a sweetish taste, resembling sugar, or rather honey and water; an uneasiness of the stomach and kidnies; a wasting of the flesh; a weariness and disinclination to motion or exertion, with the feeling of weakness; an excoriation, with soreness of the glans penis and prepuce, which is sometimes swelled, and there is no desire of venery; in females there is a peculiar uneasiness about the meatus urinarius.

The predisposing *causes* of this disease are at present obscure, but the disease has been found to occur in those who have indulged in fruit, sweatmeats, pickles, high-seasoned food, warm stimulating condiments, wine and fermented liquors, or indulgence even in the farinacea, with large quantities of small beer, accompanied by great bodily exercise, with or without active mental employment; moisture, grief, vexation or agitation of mind; sudden variations of temperature may also be regarded as predisposing or exciting causes. The proximate cause is supposed to be a morbidly increased action of the stomach, with consequent secretion, and vitiation of the gastric fluid, marked by an eagerness of appetite and acidity; the direct effects of which are the formation or evolution of saccharine matter, with a certain defect of assimilation, preventing the healthy combinations, and exciting the immediate separation of the imperfectly formed chyle by the kidnies. Dr. Baillie thinks it probable that diabetes depends, in a considerable degree, upon a deranged action of the secretory structure of the kidnies, by which the blood there is disposed to new combinations; the effect of these combinations is the production of a saccharine matter; he further thinks it probable, at the same time, that the chyle may be so imperfectly formed, as to make the blood be more readily changed into a saccharine substance, by the action of the kidnies: an opinion well worth minute enquiry.

The cure of this disease consists in confinement, an entire abstinence from every species of vegetable matter, a diet solely of animal food, and that in as small quantities as the stomach will be satisfied with; emetics, hepatised ammonia and narcotics, will be necessary, and they should be assisted by the daily use of alkalies and lime water: the hepatised ammonia should at first be exhibited in doses of five or six drops, three or four times a day; the dose is to be gradually increased, so as to produce some degree of nausea, or slight giddiness; it should not be mixed up in draughts, or in any other form, as it is readily decomposed, but it should be dropt from the phial, at the time of using it, into a proper vehicle, and taken immediately; distilled water is the best vehicle; an opiate should be administered at bed time, with from twenty to thirty drops of the vinum tartritis antimonii; this plan is to be pursued, until the morbid condition of the stomach is removed, the marks of which are, a scarcity and high-coloured state of the urine with turbidness, furnishing on evaporation an offensively-

smelling and saltish-tasted residuum without tenacity, accompanied with a want of appetite, and loathing of food; at this time the tongue and gums will be found to have lost their florid red colour, and to have become pallid; when this state occurs, exercise is to be enjoined, and a gradual return to the use of bread is to be allowed, and vegetables, such as brocoli, spinage, peas, cauliflower, cabbage, lettuce, and parsnip, in moderate quantity; these last have been observed to have been eaten with impunity: the drink should consist of such liquors as afford the least saccharine matter, as weak brandy or rum and water, with the occasional use of bitters; costiveness must be obviated by gentle laxatives, as flower of sulphur, oil of castor, or aloetics, combined with soap; the exciting and keeping up a degree of nausea, with proper doses of tartar emetic, is recommended in the early stages of the disease; the camphor and other narcotics, besides opium, are deserving of a trial; alum whey, which is made by boiling a drachm of the alum in a pint of milk, is said to considerably reduce the quantity of urine; nut-galls and lime-water have been employed with success.

Order IV.

*Vesaniæ.* Intellectual derangements.—Disorders of the judgment without pyrexy or coma. The following are the genera. 1. Amentia: an imbecility of judgment, by which people either do not perceive or do not remember the relations of things; the species are connate, from old age, from evident external causes. 2. Melancholia: a partial madness, without dyspepsy or indigestion: varying according to the different subjects concerning which the person raves; and hence admitting an almost infinite multiplicity of varieties. 3. Mania: universal madness. Idiopathic and symptomatic: under the former section mental, and corporeal, or arising from some evident disease of the body: under the latter proceeding from poisons, from passion, from febrile affection, and hence rather referable to the corporeal species. 4. Oneirodynia: a violent and troublesome imagination in time of sleep. Two species: O. activa, somnambulism or sleep-walking; and O. gravans, night-mare.

To *Mania*, with which *Melancholia* is so nearly allied, we shall devote an observation or two.

Mania often arises from intense study, violent emotions of the mind, unrestrained passions, long exposure to the scorching rays of the sun, overstraining the faculties of the mind, intemperance, organic affections of the cranium, an hereditary disposition, sanguine temperament, long-continued melancholy, suppressed evacuations, repelled eruptions, and religious enthusiasm. The proximate cause is supposed to consist in an increased excitement of the brain. It is distinguished from phrenitis by the absence of the pyrexia and head-ache, and from delirium by the state of the pulse, by the patient not knowing the place where he is, nor the persons of his friends or attendants, and from not being conscious of external objects, except when roused, and even then he soon relapses into a state of inattention; whereas in mania, he is frequently sensible, and is continually planning the means of preventing or revenging supposed injuries, and frequently the resentment is directed against his dearest friends.

*Treatment.*—According to Dr. Darwin, the circumstances which render confinement necessary are, the lunatic being liable to injure others, or himself, or not being able to take care of his own affairs; and if none of these circumstances exist, there should be no confinement; for he remarks, though the mistaken idea continues to exist, yet if no actions are produced in consequence, the patient cannot be called insane, but only delirious; and he adds, that if every one who possesses mistaken ideas, or who puts false estimates on things, was liable to confinement, he does not know who of his readers might not tremble at the sight of a madhouse: it will, however, in the first instance, always be proper to gain a complete ascendancy over the patient, either by gentle or coercive measures; his anger and violent passions must be restrained by the strait waistcoat; he should be kept in silence and darkness, and, as much as possible, in an erect posture; none of his intimate acquaintances or friends should be allowed to visit him. At the commencement of this disease blood-letting may be employed with advantage, the blood should be taken from a large orifice in such quantity as to induce some tendency to deliquium animi; when the temporal artery, or jugular vein, can be conveniently opened, it should be preferred; if the disease have been of considerable duration, bleeding will not be advisable; a solution of the gum ammoniacum, with the Glauber's salts, should be given daily, so as to keep the bowels pretty laxative; the head should be shaved, and cloths, moistened with the coldest water, pounded ice, or water artificially rendered so, should be gently wrung, and applied constantly to the head; they should be renewed as soon as they acquired any heat, until a sense of cold and chilliness are induced, when they are to be left off, and had recourse to again when necessary, or the affusion of cold water upon the head may be substituted, it should be poured from a considerable height; it is recommended to put the patient into the warm bath up to his shoulders, and then to pour cold water upon the head, previously shaved: vomits, consisting of from five to ten grains of the tartris antimonii, are recommended to be given every three or four days, for two or three weeks; opium and camphor have been employed in large doses, and frequently with advantage; the digitalis has been found particularly serviceable, it should be exhibited in gradually repeated doses, and continued until a degree of sickness is induced, or till the frequency of the pulse suffers a considerable diminution, it must then be left off, and again renewed when its effects on the constitution begin to wear off; the gratiola has been recommended in doses of ten grains, two or three times a day; hard labour, and long-continued journeys have, in some instances, effected a cure: it is proper to remark, that the pulse in mania is sometimes full and strong; when this occurs, evacuations and diluents will be necessary; at other times the pulse is quick and weak, in this case a more nourishing diet, bark, chalybeates, and small doses of opium, will be proper; in general the patient should be allowed only a low and spare diet; blistering has not been found of service, except at the commencement of the disease; the affusion of warm water on the surface of the body, that is, water of the temperature of the blood and upwards, is often employed with soothing effects. The cold bath is strongly recommended in the height of the paroxysm, except the digestion is much impaired, or the vigour of the circulation is much debilitated, the patient should be thrown in headlong, and as he comes out he should be thrown in again, until he becomes calm and rational, or very much debilitated: though in mania the temperature of the body is little or not at all increased, maniacs retain the actual heat with great tenacity, and under the above restrictions, the cold bath may

often be applied with advantage, and always with safety: after the disease is removed, it will be proper to administer bark, chalybeates, the oxyd or sulphat of zinc, and the sulphuric acid.

CLASS III.

*Cachexiæ.* Depraved habits.

A depraved habit of the whole or greatest part of the body, without primary pyrexy or neurosis. The following are the orders of this class.

ORDER I.

*Marcores.* Declines.—This order includes the following genera: 1. Tabes. Leanness, debility, hectic pyrexy. Three species; purulent, scrophulous, and from poison taken internally. 2. Atrophia; differing from tabes in being without hectic pyrexy. The species are from too great evacuation: from a deficiency of nourishment: from corrupted nourishment: from decay of the nutritive organs.

In tabes and atrophy the cure may best be effected by the removal of the remote causes, or the idiopathic diseases on which they depend; the tabes mesenterica, which is sometimes an idiopathic disease, in which there is great debility, emaciation, and paleness; there is at the same time enlargement of the head and abdomen: it will be effectually removed by small doses of the calomelas, or of the murias hydrargyri; the doses must not be so large as to excite catharsis; the hydrargyrus is intended only to act as an alterative; the solutio muriatis calcis is deserving of an unbiassed trial; the cure will be accelerated if we, at the same time, employ chalybeates, combined with a neutral salt, with fossile alkali, or with rhubarb, in such doses as to act moderately upon the bowels; the employment of a tepid salt-water bath, or washing the patient with a solution of salt, night and morning, will also be of service.

ORDER II.

*Intumescentiæ.* Morbid swellings.—An external tumour of the whole or greatest part of the body. These are adipose, flatulent, or aqueous, forming three distinct sections. Of the first is, 1. Polysarcia. Corpulency. Of the second are, 2. Pneumatosis: a tense elastic swelling of the body, crackling under the hand. 3. Tympanites: a tense, elastic, sonorous swelling of the abdomen; costiveness; a decay of the other parts. Two species; intestinal, and abdominal. 4. Physometra: a slight elastic swelling in the epigastrium, having the figure and situation of the uterus. Under the third section we have, 5. Anasarca; a soft inelastic swelling of the whole body or some part of it; arising from a multitude of causes, and hence admitting of a multitude of species. 6. Hydrocephalus. A soft inelastic swelling of the head, with the sutures of the cranium opened. 7. Hydrorachitis. A soft slender tumour above the vertebræ of the loins; the vertebræ gaping from each other; formerly denominated spina bifida. 8. Hydrothorax. Dropsy of the chest. Dyspnœa, paleness of the face; oedematous swellings of the feet; scanty urine; lying down difficult; a sudden and spontaneous waking out of sleep, with palpitation; water fluctuating in the chest. 9. Ascites. A tense, scarcely elastic, but fluctuating swelling of the abdomen. Two species: one A. abdominalis, extending over the whole abdomen with an equality of tumour, and a fluctuation sufficiently evident, arising from an obstruction of the viscera, from debility, or from thinness of the blood; the other, A. saccatus, confined in a bag, the swelling more partial, and the fluctuation less evident. 10. Hydrometra. Dropsy of the womb. A swelling of the female epigastrium gradually increasing, preserving the shape of the uterus; yielding to pressure, and fluctuating; without ischury or pregnancy. 11. Hydrocele. Swelling of the scrotum, not painful, increasing by degrees, soft, fluctuating, and pellucid. 12. Physconia. A swelling chiefly occupying a certain part of the abdomen, and neither sonorous nor fluctuating. These species are very numerous, and named from the part the disease occupies, whence we have physconias, hepatic, splenic, renal uterine, &c. 13. Rachitis. Rickets. A large head, swelling most in the fore part, the ribs depressed; abdomen swelled, with a decay of the other parts. It varies merely in being simple or conjoined with other diseases.

From this list it will appear obvious, that a preternatural collection of serous or watery fluids is often formed in different parts of the body; and although the disease arising from it is distinguished by different names, according to the various parts occupied, yet those collections all come under the general appellation of dropsy. When water is diffused through a part, or the whole, of the cellular membrane, the disease is called anasarca; when there is a collection of water within the cavity of the cranium, it is named hydrocephalus internus; when upon the vertebræ of the loins, it is called hydrorachitis; when within the cavity of the thorax, it is named hydrothorax; when it is contained within the cavity of the abdomen, it is called ascites; when in the uterus, hydrometra; and when it is collected within the scrotum, it has the appellation of hydrocele. We can only notice a few of these.

The removal of *anasarca* must be attempted by removing the remote causes, which still continue to act, by evacuating the collected fluid, and by restoring the strength of the system. The remote causes are often such as have been removed before the disease occurs, although their effects continue; for the most part, those causes are certain diseases or habits, previous to the occurrence of the disease, which are to be cured by proper remedies, adapted to their causes, and by desisting in particular from indulgence in the use of ardent spirits, when the origin of the disease can be traced from that source; the collected fluid must be drawn off by scarifications, the punctures of which must be made small, and at some distance from one another, as there is a tendency in wounds, made in dropsical cases, to become gangrenous; issues, or the daily application of a thin slice of mezereum, steeped in vinegar, will be proper, they should be made a little below the knees; colewort leaves should be applied to the feet and legs, which must be removed occasionally as they become imbued with moisture, or bootkins should be made of oiled silk, and bandages should be applied to the lower extremities; emetics are also very serviceable, they should consist of ipecacuanha, tartar emetic, or squills, with a few grains of the sulphat of copper; the most powerful remedies, however, are cathartics, which dropsical patients in general bear more easily than emetics; those in most general use are, gamboge, jalap, colocynth, scammony, calomel, and elaterium; this last should be exhibited in the form of a pill, or given in diluted spirits, in doses of half a grain or more, every hour, until vomiting or catharsis is excited; but the most powerful remedy is the crystals of tartar, which should be administered in doses of two drachms

every hour, till copious evacuations are procured either by stool or urine, giving at the same time tepid liquids plentifully; this medicine should be repeated every, or every other morning, according to the strength of the patient; as the thirst is a very distressing symptom in this disease, the patient should be allowed to take as much water, or mild mucilaginous liquids, acidulated with the crystals of tartar, as he feels disposed for; bottled cyder, drank in considerable quantities, is sometimes of service; diuretics must be administered, and they should be combined with tonics and aromatics, or with essential oils; the most powerful medicine of this class, however, is the digitalis, and it is most efficacious when joined with some of the above diuretics: it should be given in such doses as to affect the state of the pulse, and if it does not speedily afterwards act as a diuretic, it will be of little avail to persevere in its exhibition; as the perspiration is often greatly diminished, diaphoretics have sometimes been employed with advantage, or opiates combined with ipecacuanha, and the action of the vessels upon the surface will be excited by friction, particularly in the morning, and it will be more serviceable if made from below upwards; if the above methods should be of no avail we must try mercury, and it should be pushed so far as to affect the mouth, and its effects on the system must not be allowed to cease until the swelling subsides. The debility of the system will be removed by studiously avoiding all the remote causes in our power, by gentle exercise, by supporting the integuments of the lower extremities by means of bandages properly applied, as a well-constructed laced stocking, and by the employment of bark, quassia, sulphuric acid, and chalybeates, and they will be more efficacious when combined with diuretics; the vapour bath has been employed with considerable advantage, especially when assisted by frictions; if the disease arises in consequence of obstructions of the viscera, or siphilis, some of the preparations of mercury will be necessary, employing at the same time chalybeates and tonics. The pulse has been sometimes, although rarely, found full, hard, and tense, in which case blood-letting is advisable.

*Hydrocephalus* generally attacks children, and very often comes on in a very gradual manner; one of the earliest criterions is the patient being uneasy on raising his head from the pillow, and wishing to lie down again immediately; it frequently commences with languor, pains in the limbs, and head-ach; the patient is affected with nausea and vomiting several times in the course of the day, the pain of the head is usually confined to one side, or extends from just above the eye-brows to the temples; sometimes, however, it is universal over the whole of the head; the head-ach frequently alternates with the affection of the stomach, and the head is now and then observed to lean more to one than the other side; the eyes are painfully sensible to the light, there is moaning and watchfulness, or, if the patient sleeps, he grinds his teeth, picks his nose, and often awakes suddenly in a fright; the bowels are costive, and are with difficulty acted upon by the strongest purgatives; the pulse is more frequent than in health, but regular; these symptoms go on increasing, the pupils become dilated, and the axes of the eyes are turned in different directions; the vomiting and pain of the head become more distressing, there is some difficulty of breathing, the heat of the body, and of the head in particular, is increased, pyrexy comes on, of which there are perfect intermissions many times in the course of the day, with an evident exacerbation in the evening; the countenance is occasionally flushed, and the pulse, from being frequent, now becomes slow and irregular: as the disease advances the pain of the head somewhat abates, and a degree of stupor or coma succeeds the watchfulness of the former stage, and if they are roused, they are fretful, and often utter dissonant and loud screams, the hands are often lifted up to the head, and the strabismus becomes more considerable, the pupils are more dilated, and scarcely contract when exposed to a strong light, sometimes there is a total defect of vision; they swallow liquids with unwillingness and some apparent difficulty; the vomiting now ceases, the disposition to costiveness continues; now and then, however, dark stools are evacuated, in which worms are frequently observed; when the disease has continued in this state for a few days, the pulse again becomes regular and frequent, but very weak; the breath is drawn with difficulty, and with a stertorous noise, the patient is frequently affected with loud shriekings, red spots appear on different parts of the body, particularly about the joints, and at length convulsions come on, and close the scene.

As hydrocephalus frequently runs rapidly to its fatal termination, we must employ the most active remedies in the first stage; the most powerful remedy, at the commencement of this deplorable disease, is blood-letting: in children it will be sufficient to apply leeches to the temples at proper intervals; in adults we may, with great propriety, employ general blood-letting, in general, however, local blood-letting will be most serviceable; costiveness must be obviated by the more active cathartics, as the calomel combined with the gamboge, scammony or elaterium, and by the employment of clysters; the head should be shaved, and a large blister applied over the whole of it, or between the shoulders; it will be proper to keep up the discharge occasioned by the blister for some time, in which case an alternation of them from the head to the back, or behind the ears, will be attended with more beneficial effects than a perpetual blister; the velocity of the circulation will be diminished by the exhibition of the digitalis, and if we have reason to conclude that an effusion has taken place, the absorption of the fluid will be promoted by combining the digitalis with calomel; the latter must, however, be administered at proper intervals, in such doses as will produce some affection of the mouth; opiates should be given at the same time, and if the patient is very much debilitated, it will be proper to exhibit bark and chalybeates; errhines may be tried, as one grain of turbeth mineral, mixed with from ten to fifteen grains of sugar or liquorice powder; this should be gradually blown up the nostrils: frequent electric shocks, from very small charges, are recommended to be passed through the head in all directions; the hydrocephalus is sometimes symptomatic of worms, disorders of the bowels, or mesenteric affection; when this is the case, the disease will generally be removed in a short time by the employment of mercurial cathartics, combined with other active purgatives, by blisters, and by some of the preparations of iron.

*Rachitis*.—This disease seldom makes its appearance before the eighth or ninth month, or after the second year of the child's age; it appears first with a flaccidity of the muscles, and falling away of the flesh, although the food is taken in in large quantities; if the child is able to walk, a difficulty of breathing, and palpitation of the heart, will be

perceived on its walking a little faster than usual; the face is pale, and somewhat bloated, and the child becomes daily more averse to exercise or motion; the head appears large in respect to the body, and the forehead becomes unusually prominent; the fontanelle and sutures are more open than usual, the ribs lose their convexity, and become flattened at the sides, and the sternum is pushed outwards, and forms a sort of ridge; the joints become enlarged, while the limbs between them appear, or become slender, and variously distorted; the spina dorsi in particular becomes very much incurvated, and the whole figure is sometimes distorted in such a manner as to resemble the letter S; the abdomen is hard and preternaturally tumid, and the other parts of the body are emaciated; the appetite is but little or not at all impaired, and the stools are frequent and loose; the dentition is not only slow but later than usual, and the teeth, soon after their appearance, become decayed, and frequently fall out; the faculties of the mind are sometimes impaired, more frequently, however, they possess a premature acuteness of the understanding; on the first appearance of the disease the system is but little affected, but after a short time febrile symptoms are generally present; the disease after a while often ceases to advance, and the health is re-established, but the limbs remain distorted; in other cases, it goes on increasing till every function is affected, and at length terminates in death, in consequence of inability to distend the chest, owing in all appearance to the softness of the bones. In the bodies of those who have died of this disease various morbid affections have been discovered in the internal parts in particular; the abdominal and thoracic viscera have been found in a diseased state, and the bones are sometimes so soft that they can be readily cut through with a knife.

The remote causes are, debility, an impure and humid state of the atmosphere, poor milk, hereditary disposition, bad air, deficiency of proper exercise, want of cleanliness, and an improper diet. The proximate cause is supposed to be a deficiency of calcareous earth and phosphoric acid.

The removal of this disease will be effected by gentle emetics in the first instance; it will not, however, be necessary to repeat them very frequently; bark should be administered in moderately large doses, but as there is often a difficulty in administering it in substance, in proper quantities, the extractum cinchonæ is to be preferred, or the oxyd or sulphat of zinc, or some of the preparations of iron must be employed, and they will be more efficacious if administered in combination with calcined hartshorn or chalk, or with a neutral salt and rhubarb, in such proportion as will keep the bowels gently laxative; the phosphate of lime and of soda are recommended in equal parts to the extent of a scruple, twice a-day; and washing the surface of the body with a solution of potash, in the proportion of half an ounce to a pint of water, morning and evening, is also of service, taking care, however, to wipe the skin perfectly dry; the body must be well rubbed with flannel, and the spina dorsi should be rubbed with volatile alkali; the diet should be light and nourishing, and port wine should be allowed; exercise in the open air, in dry weather, should be strictly enjoined, and as gestation can only be employed, the child should always be carried in a horizontal posture, as moving them in any degree of an erect one is liable to increase the distortion, and they should lie down frequently in the course of the day, and some of the ingenious contrivances mentioned in the Zoonomia should be employed: the cold bath may be made use of, or a bath of the temperature of the Matlock bath, which is 66°, or of the Buxton, which is 82°, would perhaps be preferable, and more beneficial. The prophylaxis consists in cold-bathing, frictions, and proper exercise.

ORDER III.

*Impetigines.* External deformities.—Cachexies chiefly deforming the skin and external parts of the body.

The following are the genera of this order. 1. Scrophula; king's evil. Swellings of the conglobate glands, especially in the neck; swelling of the upper lip and support of the nose; the face florid, skin thin, abdomen tumid. Four species; common, mesenteric, temporary, from resorption of the matter of ulcers in the head, and West Indian, catenated with the yaws. 2. Syphilis; venereal disease. A contagious disease after impure venery, and a disorder of the genitals; ulcers of the tonsils; of the skin, especially about the margin of the hair; corymbous papulæ terminating in crusts and crusty ulcers; pains of the bones and exostoses. 3. Scorbutus; scurvy. In cold countries attacking after putrescent diet, especially such as is salt and of the animal kind, and when there is no supply of fresh vegetables; asthenia; stomacace; spots of different colours on the skin, for the most part livid, and appearing chiefly among the roots of the hair. 4. Elephantiasis; Arabian leprosy. A contagious disease: thick, wrinkled, rough, unctuous skin, destitute of hairs; anæsthesia in the extremities, the face deformed with pimples; voice hoarse and nasal. 5. Lepra; Greek leprosy. Skin rough with white branny and chopped escars, sometimes moist beneath, with itching. 6. Frambæsia; yaws. Swellings resembling fungusses, or the fruit of the mulberry or raspberry, growing on various parts of the body. This disease is placed by some nosologists in the class and order pyrexiæ, exanthemata, as constantly accompanied with pyrexy, and only attacking a man once during life. 7. Trichoma; bleeding-hair. A contagious disease; the hairs thicker than usual, and twisted into inextricable knots and cords. It is almost confined to certain parts of the north of Europe; and rarely extends out of Poland. 8. Icterus; jaundice. Yellowness of the skin and eyes; white fæces; urine of a dark red; tinging what is put into it of a clay colour. Five species; calculous; spasmodic (after spasmodic diseases of the mind); hepatic; from pregnancy; and infantile, attacking infants a few days after birth: for which last see the article INFANCY.

*Scrophula.*—The symptoms are known too generally. The most efficacious remedies which can be employed are sea-bathing, and the internal use of salt water; a change to a warm climate, and a nourishing diet. A trial of the chalybeate and sulphureous waters should be recommended; the digitalis and a solution of muriat of barytes have often been administered with evident advantage; the latter appears to be a medicine well calculated to correct the scrofulous diathesis; bark, combined with carbonat of soda, is strongly recommended; the preparations of iron should be ordered, and a small quantity of rhubarb should be joined with them; a grain or more of opium, twice a day, is sometimes of service; hemlock is getting into disuse, perhaps undeservedly. The external remedies most suitable for scrofulous tumors and ulcers are sea-water poultices, and bruised sea-tang; the

leaves of wood sorrel (oxalis acetosella) bruised, are strongly recommended, and appear to have been employed with advantage; linen rags kept constantly moistened with a solution of the sugar of lead, or of muriated mercury, should be applied to the parts affected; a small quantity of powder, composed of seven parts of bark, with one part of white oxyd of lead, is recommended to be applied to scrofulous ulcers, by means of lint and a bandage, and renewed daily; or they may be sprinkled with carbonat, or oxyd of zinc; it will be proper always to apply moderate pressure upon the parts, which will tend to heal the ulcers; oxygen gas has been employed with evident advantage; electricity might perhaps produce good effects, if had recourse to at the commencement of the disease; the solution of muriat of lime is strongly recommended, and it is certainly deserving of a full and fair trial; the dose should be gradually increased, and when qualms and sickness are produced, we may consider these as signs of an overdose; it is also proper to observe, that it is sometimes necessary to employ gentle laxatives under its use, as it is apt to induce costiveness.

*Scorbutus*—Soreness of the gums, with a spongy swelling, and bleeding upon the least touch; the face lurid; bloated; ancles œdematous; lassitude and depression of spirits; pains in the limbs and thorax; the hands contracted and rigid; the debility increasing, so that at length a simple attempt to acquire an erect position is productive of syncope, or even death. The appetite for food is generally unimpaired in every stage of the disease, the skin becomes dry and rough, and the urine is scanty and high-coloured; vibices appear in different parts of the body, and there are small specks, generally of a purple colour, very little raised above the surface of the skin, and if a part is bruised in any stage of the disease, ecchymosis immediately takes place; the pulse is generally weak, the tongue is of its natural appearance, the bowels are either very much confined, or the patient is troubled with diarrhœa, accompanied with griping pains. In the last stage of the disease the breath becomes remarkably fetid; the urine, after it has been voided some hours, is covered with an oily pellicle, and blood issues from the mouth, nose, anus, urinary passages, sometimes even from the ends of the fingers, and pores of the skin. There is a remarkable symptom sometimes attendant on this disease, even in its incipient state, mentioned by Dr. Blane, in his valuable work on the Diseases of Seamen, in which the patient complains of an almost total blindness towards evening, when no other visible symptom of the disease is present; but the complaint uniformly betrays itself by ecchymosis, in cases of bruises, or by scorbutic ulcers, which are very difficult of cure. It chiefly affects sailors, and people shut up in besieged places, who are deprived of fresh provisions and vegetables; this, however, is not always the case, as in cold climates it is sometimes produced by a very scanty though not salt diet, under the influence at the same time of cold, damp, and foul air and indolence.

This disease will be most certainly removed by fresh vegetables, and the expressed juice of lemons, limes, oranges, and other subacid fruits; the two first are, however, the most powerful antiscorbutics, and it is worthy of remark, that the recovery will be more speedy when fresh vegetables alone, and no animal food, are employed, than when fresh animal food is made use of without vegetables; the essence of malt, or of spruce, will often be found of considerable service. As there is generally an obstruction of the perspiration, we should endeavour to excite a gentle diaphoresis by means of the pulvis ipecacuanhæ compositus, or by camphor, combined with the nitre potassæ and opium; vegetables are particularly useful, such as celery, water-cresses, cabbages, mustard, horse-radish, and many others of the class tetradynamia. As a free flow of urine is found to promote recovery, we should endeavour to solicit it by means of some of the preparations of squills; wine, chalybeates, bark, and the mineral acids, should be exhibited, when lime or lemon juice cannot be procured, and sour krout, and what in Scotland is called souins, are very useful articles of diet: a solution of the nitre in vinegar, in the proportion of from two to four ounces of the former to a quart of the latter, is strongly recommended; from one to two ounces, or more, may be given two, three, or four times in the course of the day: the sponginess of the gums will be removed by a solution of the alum, or by astringent gargles, in which muriatic acid is a component part: the contraction of the hams, and the livor and hardness of the calves of the legs, will be relieved by warm fomentations and emollient poultices: a poultice of wood-sorrel should be applied to the ulcers, or, if that cannot be procured, the nitrous vinegar may be employed, but the best application is lemon juice. The remote causes must, as far as lies in our power, be avoided; the greatest attention must be paid to cleanliness; exercise must be enjoined, and the air must be corrected by fires and ventilation; the only certain preventives are fresh vegetables, exercise, and the nitric acid. Oxygen should be introduced into the system by such medicines as are known to contain it, or by inspiring it when chemically produced.

*Icterus* is easily discovered from the yellow hue it produces. The cure consists in the removal of the exciting causes, and alleviation of urgent symptoms; the most frequent exciting causes are calculi, the passage of which will be promoted by gentle emetics; for this purpose the ipecacuanha is the best medicine; it should be exhibited in small and divided doses, so as to occasion, for a time, a degree of nausea, but ultimately to produce its full effects; the costiveness must be removed by the calomel, combined with rhubarb and soap, or by administering oil of castor: where the pain is very violent, attended with a slow pulse, the warm bath and fomentations of the epigastrium will be necessary, or bladders filled with hot water, or bags of hot sand applied to it; opiates will be very serviceable, but as there is costiveness the inspissated juice of henbane would be a preferable medicine; æther, with yolk of egg, is recommended as having a tendency to dissolve inspissated bile; unboiled acrid vegetables are useful, as lettuce, mustard, cresses, &c. electric shocks should be passed through the duct, at proper intervals; mucilaginous diluents should be freely allowed, and emollient clysters should be frequently injected. In cases of pyrexy attended with local pain and dyspnœa, blood-letting and the antiphlogistic regimen may be employed with great advantage; and after the pain is removed and the arterial energy becomes weakened, some of the preparations of iron may be used with great benefit; seltzer or soda water should be drank in moderate quantities, or it may be made at the time of taking it by dissolving a drachm of the carbonat of soda in a pint of water, and adding twenty drops of muriatic acid, drinking it off as soon as mixed; or, instead of the muriatic

acid, it may be saturated with carbonic acid, by means of Dr. Nooth's glass apparatus; there is an artificial sort of seltzer water sold in London, which is prepared in a much better manner than we are able to do it in general, and the name of the proprietor is Schweppe. If the disease arises in consequence of tumors, or pressure of surrounding parts, small doses of the calomel, or some other preparation of mercury, may be useful, employing, at the same time, some of the preparations of iron, or natural chalybeate waters; gentle exercise on horseback is particularly serviceable in promoting the passage of calculi, and preventing the stagnation of bile in the gall-bladder.

## CLASS IV.

*Locales.* Local affections.

A reference to the nosological table of the system we have selected in this work will prove this class to be of a very voluminous as well as of a very complicated nature; and as we have already observed intended to take in every disease which could not easily be introduced under the preceding classes. More than half the maladies of which this class consists belong to the department of surgery; such as, for instance, all the genera in the order tumores, and many of those in the order dialyses. Of the rest many are altogether incurable, and many may more conveniently be described under the article Midwifery. On this account, instead of giving a detail of the entire genera, of which the present class consists, with their definitions and modes of treatment, we shall refer the reader to the previous table for their respective names and arrangements; and shall only select for further remark those that appear of more prominence and general importance than the rest, and which can only with propriety be described in the present article.

*Amaurosis* is loss of sight without visible cause or injury. In this disease the eyes appear natural, but the pupil is dilated, and does not contract upon being exposed to the strongest light; it is sometimes attended with head-ach. The remote causes are, compression of the brain, either from congestion or mechanical pressure, cataract, atony, paralysis of the optic nerve or inirritability of it. The proximate cause is the insensibility of the retina.

If the disease arise from the first-mentioned cause, it may be removed by the means necessary in those cases; when it arise from atony, or paralysis of the optic nerves, we must employ stimulants, as blisters to the temples; electricity is of singular service; sparks should be taken from the eyes, and shocks should be sent through the head; errhines will be very useful, as the turbeth mineral, in the proportion of a grain to eight of liquorice powder, one-fourth of which is to be snuffed up the nostrils once or twice a day; and we must at the same time employ the internal stimulants recommended in the treatment of paralysis; opium, and muriated mercury, in doses of a quarter of a grain of each twice a day, a blister on the crown of the head, and repeated minute electric shocks, passed through the eyes, are recommended in the early stages of this disease. The cataract, as requiring a surgical operation, does not properly come under consideration. Albugo, or opacity of the transparent cornea, which often remains after inflammation, or syphilis, may sometimes be removed by repeated blisters to the temples; the long-continued use of electricity, and the aqua ammoniareti cupri, should be introduced into the eye, and it will sometimes require dilution; or prepared glass reduced to an impalpable powder, in a mortar of agate, and mixed with honey or mucilage, is to be applied to the eyes by means of a camel-hair pencil, two or three times a day; the linimentum sepiæ compositum, and infusion of Guinea pepper, are recommended in strong terms, and are certainly deserving of a trial.

Of *Deafness* the causes are innumerable. It may be a defect in the organ of hearing; too great dryness of the ear, hardened accumulated wax obstructing the passage of sounds; inflammation of the membrana tympani, inflammation or obstruction of the Eustachian tubes, syphilis, and atony, or paralysis of the auditory nerves. When it arise in consequence of organic affection, all our endeavours will generally prove fruitless, but when it arise from obstruction of the Eustachian tube, it will be commonly removed by puncturing the membrana tympani: if from too great dryness of the ear, a few drops of a mixture, composed of half an ounce of oil of almonds, and forty drops of oil of turpentine, is recommended; it should be applied to the internal ear by means of a dossil of cotton, taking care to keep the cavity clean, by wiping it daily with a large camel-hair pencil. If it arise from hardened wax, the interior cavity must be softened by frequently injecting warm water and soap, or a solution of sea-salt in as much water as will barely dissolve it, which last is an excellent solvent of the wax; the ear may afterwards be cleansed by syringing it with warm water: the wax may also be softened by occasionally insinuating into the ear a few drops of a mixture, composed of three parts of ox gall, and one part of the balsam of Peru; this is also of service when there is a fetid discharge from the ear, or a diseased state of its secretions: when it arises in consequence of inflammation, topical blood-letting, blisters behind the ears, and exclusion of the external air, will be necessary. If the disease proceed from an affection of the Eustachian tubes, stimulating gargles and injection will be proper, at the same time powerful errhines may be employed; and where the patient hears better when there is a loud voice, he should stop the mouth and nostrils, and force the air into the tubes, by violent efforts of expiration, and if one effort be not sufficient for that purpose, he should employ repeated ones. When it is induced by atony, or paralyses, æther, garlic-juice, and other stimulants, should be applied by means of a dossil of cotton; errhines also are of considerable utility, and should be snuffed up the nose two or three times a day; blisters behind the ears, electricity, and internal stimulants, will likewise prove useful auxiliaries. If the disease arises in consequence of syphilis, we must apply to a full course of the mercury. Whenever deafness is not easily removed by the ordinary means, the application of blisters behind the ears will often be of service.

*Enuresis.* Involuntary flow of urine.—The causes are atony or paralysis of the sphincter of the bladder; irritation or compression of the vesica urinaria; the latter period of pregnancy; laxation of the vertebræ.

If the disease proceed from atony, the perinæum must be frequently bathed with cold water, repeated blisters must be applied to it, and to the os sacrum; we should at the same time administer internal tonics and stimulants, as bark, zinc, and some of the preparations of iron, tincture of cantharides, and the cold bath. If it be induced by paralysis, blisters, electricity, and internal stimulants must be employed. If from irri-

tation, or compression of the bladder, the cause of it must be discovered, and the proper means of removing it be had recourse to; and if it be a consequence of the pressure of the gravid uterus, the patient should be kept as much as possible in a horizontal posture.

*Ischuria.*—Of this disease there are four species: as affecting the kidneys, ureters, bladder, or urethra. The first proceeds from nephritis, calculi, spasm, grumous blood, or pus in the pelvis of the kidneys, paralysis, and sometimes inflammation of the intestines, or mesentery. If the disease arise from the first-mentioned cause, which will be readily discovered by a careful attention to the symptoms, it will be removed by the means pointed out when treating of that inflammation: if it be the consequence of calculi, which will be known by the attendant symptoms, which are a frequent desire of making water, often suddenly stopped as it flows in a full stream, heat and pain soon after the evacuation of it, tenesmus, an itchiness of the anus, and extremity of the urethra, colic pains, costiveness, nausea, and frequently vomiting, pain and retraction of the testes, and pain or a sense of weight in one or both thighs, blood-letting will be requisite, in proportion to the violence of the symptoms of excitement; laxatives will at the same time be necessary, and the antiphlogistic regimen must be strictly adhered to: the irritation will be allayed by the employment of the warm bath, fomentations, opiates, watery, farinaceous, and mucilaginous fluids, turpentine clysters, and stimulating liniments to the region of the kidneys. If it proceed from a spasmodic affection, opium, æther, hyoscyamus, and the warm bath, are the proper remedies: when it arise from grumous blood, or pus, contained in the pelvis of the kidneys, we must promote the expulsion of them by the warm bath, diluents, opiates, and emollient laxative clysters. If it proceed from paralysis, internal and external stimulants, electricity, and the remedies recommended in the treatment of paralysis, must be employed; and if from the last-mentioned cause, the most powerful means of removing such inflammations must be employed with diligence, and those means are pointed out in another place.

In ischury from complaint in the bladder there is a suppression of urine, accompanied with a circumscribed tumour of the hypogastrium, and a sense of distention in it, and an acute or obtuse pain about the neck of the bladder, attended with a frequent inclination to make water.

When the disease arises from the first-mentioned cause, it will be removed by blood-letting, laxatives, emollient laxative clysters, opiates, the warm bath, and friction of the hypogastrium, with a strong solution of camphor in olive oil, and if we do not succeed by those means, we must draw off the urine with the catheter; and in desperate cases have recourse to puncturing the bladder, either above the pubes or by passing a trocar into it from the rectum. If the disease arise from schirrus of the prostate gland, mercury, hemlock, sarsaparilla, and sea-bathing, should be recommended. If it be the consequence of paralysis, electricity, tincture of cantharides, and repeated small blisters will be proper. When it proceeds from spasm, opiates must be employed internally and externally, emollient laxative clysters, the warm bath, and a strong solution of the camphor; and if the patient be plethoric, it will be advisable to take away some blood. When the disease is caused by over-distention of the bladder, from the too long retention of the urine, cold substances must be applied to the hypogastric region, and cold water should afterwards be injected into the bladder. If induced by the presence of grumous blood, pus, or mucus, these are to be removed by tepid injections, diluents, and by the other means recommended in the treatment of the first species. If ectopia of the bladder be the occasion of it, we must endeavour to bring the parts into their proper situation, by the means adapted to their cause. If it arise from calculi, this will be discovered by there being an uneasy sensation, at the orifice of the urethra, after making water; sometimes a dull pain at the neck of the bladder, with a frequent desire of emptying the bladder, and the water often passing drop by drop, or the stream being suddenly interrupted; there will be also a considerable mucous sediment, and some degree of tenesmus, and the patient will generally void his urine, when in a horizontal position. Under these circumstances, when the pain is considerable, two drachms of turpentine, incorporated with yolk of egg, and mixed with half a pint of gruel, with from sixty to a hundred drops of laudanum, should be injected; costiveness must afterwards be obviated by rhubarb, combined with soap, or with small doses of calomel, or the saline cathartics; the uva ursi should be administered in doses of a scruple, or more, three times a day, and the dissolution of the calculus must be attempted by lithontriptics, as a drachm of the vegetable alkali, dissolved in a pint of water, supersaturated with carbonic acid gass, three times a day; seltzer or soda water may be employed with advantage, or a large spoonful of a mixture, composed of half an ounce of the aqua potassæ, and six ounces and a half of the aqua calcis, in some mucilaginous liquor, may be given three times a day: when scybala in the rectum occasion the disease, injections of warm oil, or the internal employment of oil of almonds or castor, with laxative and emollient clysters, together with dashing the lower extremities with cold water, will generally succeed in promoting their evacuation. If it arise from flatus, we must employ essential oils and antispasmodics. If it be the consequence of an abscess, which will be discovered by the previous throbbing pain and nature of the discharge, after the bursting of the abscess, the frequent use of warm emollient and oily clysters will be necessary; and if it arise in consequence of the pressure of the gravid uterus, the urine must be drawn off by means of the catheter, until after delivery, when the complaint will cease of course.

*Herpes.* Tetters.—This disease will be removed by the exhibition of some of the following remedies, as the sulphuric acid, tincture of cantharides, or black hellebore, or muriated mercury, combined with tartar emetic, and opium, Plummer's pill, or a solution of gamboge, in spirit of ammonia may be given; employing, at the same time, lime-water, or the decoction of guaiacum sarsaparilla or elder; the parts should be dressed with the unguentum nitratis hydrargyri, or with the sulphuric acid, mixed with eight times its quantity of pork lard: and we should at the same time employ the warm bath: the pulp of cassia moistened with milk, and the cassia sophera of Linnéus boiled in vinegar, are recommended upon good authority.

*Tinea.* Scald-head.—This contagious eruption affects the whole of the hairy scalp, and is gener-

ally most virulent around the edges of the hair, on the back part of the head, often causing, by the acrimony of the discharge, swelling of the lymphatic glands of the neck. The first step necessary to be taken in the removal of this unpleasant complaint will be to shave the head close, after which it should be well fomented, and cloths moistened in a solution of liver of sulphur in lime water, in the proportion of half an ounce of the former to a pint of the latter, should be constantly applied to the head, or tar-ointment may be employed, and the access of the air should be prevented by means of a bladder, properly fitted to the head, or a solution of sugar of lead, or of green or blue vitriol, may be tried, and the internal remedies recommended in the treatment of herpes should be employed: if we do not succeed by these means, blisters or an issue should be applied on the head or adjacent parts.

*Psora.* Itch.—This consists of little watery pimples of a contagious nature, which first appear between the fingers and on the wrists, but in process of time spreading over the whole body, except the face, attended with a great degree of itchiness, especially when warm in bed, or exposed to the heat of a fire. This disease will most certainly be cured by the application of sulphur ointment, taking at the same time flowers of sulphur; the unguentum calcis hydrargyri albi or acidi sulphurici, or a solution of oxyd of arsenic, or of muriated mercury, will also speedily remove it; the two last remedies should, however, be employed with much caution; a decoction of white hellebore is also a useful remedy. It may likewise be frequently cured by the exhibition of the sulphuric acid, in doses of from thirty to sixty drops, or more, two or three times a day, and to obviate its griping, it should be given in some mucilaginous fluid.

MEDICIS (Cosmo de), called the Elder, son of John de Medicis, was born at Florence, September 1389. Although in a private station, he appeared with the splendour of the most powerful sovereign; and his fortune, accumulated by successful commerce, was surpassed by the revenue of few princes. He was partial to the sciences, and liberal to men of genius. His library consisted of a vast number of books of his own collecting, and he enriched it with many scarce and valuable manuscripts. Banished from his native country by the envy which his riches inspired, he went to Venice, where he was received with the honours due to a sovereign prince. His countrymen soon perceived their error, and recalled him from banishment. For 34 years he was supreme judge of the republic; and his advice was solicited by the greater part of the cities and sovereignties of Italy. This great man died August 1464, in the 75th year of his age, full of happiness and glory. On his tombstone he is styled, "Father of the people, and deliverer of his country."

MEDICIS (Laurence de), styled the Great and the Father of learning, was born A.D. 1448. He was the son of Peter, the grandson of Cosmo, and the brother of Julian de Medicis. These two brothers, who were in possession of absolute power at Florence, excited the jealousy of Ferdinand of Naples and Pope Sixtus IV. The first hated them, because they had ruined his influence in Florence; and the second, because they opposed the advancement of his nephew. It was at their instigation that the Pazzi conspired against them. Julian was murdered while he heard mass April 26th 1478; and Laurence, who was only wounded, was carried back to his house in the midst of the shouts and acclamations of the people. Heir to the greater part of his grandfather's virtues, he was, like him, the Mæcenas of his age. It was equally astonishing (says an historian of that country) and foreign to our manners, to see the same man engaged in commerce, and supporting the burden of the public affairs; conversing with factors, and receiving ambassadors; giving shows to the people; affording an asylum to the unfortunate; and adorning his country with many magnificent buildings. He was so much beloved by the Florentines, that they appointed him chief magistrate of the republic. By his unbounded liberality, he drew to his court a great number of learned men. He sent John Lascaris into Greece to recover manuscripts, with which he enriched his library. He cultivated learning himself, and was the author of the following works: 1. Des Poesies Italiennes, Venice, 1554, 12mo. 2. Canzonne à ballo, 1568, 4to. 3. La Campagnia del Mantellaccio Beoni, with the sonnets of Burchiello, 1558 or 1568, 8vo. Laurence de Medicis was so universally admired, that the princes of Europe did him the honour to appeal their differences to his decision. It is even reported, that Bajazet emperor of the Turks, to shew him a mark of esteem and regard, caused search for the murderers of his brother Julian in Constantinople, and sent back one of them who had concealed himself in that city. Pope Sixtus IV. was the last of his enemies; but he opposed him with so much ability, that he brought him to terms of accommodation. This illustrious man died April 9th 1492, aged 44. His reputation was sullied by his passion for women and by his infidelity. His two sons, Peter who succeeded him and who was expelled from Florence in 1494, and John who went by the name of pope Leo X. were like their father remarkable for their generosity and their love of learning. Peter died in 1594, leaving Laurence, the last male issue of his branch. Laurence was the father of Catharine de Medicis, who married Henry II. king of France.

Mr. Roscoe has written an elegant life of this Laurence de Medicis, in 2 vols. 4to.

MEDIETAS LINGUÆ, in law, signifies a jury, or inquest impannelled, of which the one half are natives of this land and the other foreigners. This jury is never used except where one of the parties in a plea is a stranger and the other a denizen. In petit-treason, murder, and felony, foreigners are allowed this privilege; but not in high-treason, because an alien in that case shall be tried according to the rules of the common law, and not by a medietas linguæ. A grand jury ought not in any case to be of a medietas linguæ; and the per-

son that would have the advantage of a trial in this way is to pray the same, otherwise it will not be permitted on a challenge of the jurors.

MEDI'ETY. *s.* (*medieté*, French.) Middle state; participation of two extremes; half (*Brown*).

MEDINA, a city of Arabia Felix, in the province of Hedjás, about a day's journey from the Red sea. It is a town of moderate extent, surrounded with indifferent walls, and situated in a sandy plain. It belongs to the sherriffe of Mecca, but has of late been governed by a sovereign of its own, of the family of Darũ Barkad. At this present time, the sherriffe rules it by a vizir, who must be of the royal family. Before the days of Mahomet, this city was called Jathreb, but it was called Medinet en Nebbi, the city of the prophet, from the period at which Mahomet, upon his expulsion out of Mecca, by the Koreischites, took refuge here, and continued to make it the place of his residence for the rest of his life. The tomb of Mahomet at Medina is held in respect by the Mussulmans; but they are not obliged to visit it in order to the performance of any devotional exercises; only, as the caravans from Syria necessarily pass near by Medina, in their return from Mecca, they turn aside to behold the prophet's tomb. It is situate in the corner of the great square; whereas the Kaba is in the middle of the square at Mecca. For fear that the people might superstitiously offer worship to the ashes of the prophet, the tomb is inclosed within the iron rails, and is only to be seen by looking through these. This tomb is placed between two other tombs, in which rest the ashes of the two first caliphs. Although not more magnificent than the tombs of the founders of most other mosques, the building that covers it is hung with a piece of silk stuff, embroidered with gold, which is renewed every seven years, by the pacha of Damascus. This building is guarded by forty eunuchs, chiefly for the security of the treasure which is said to be kept in it. This treasure consists chiefly of precious stones, the offerings of rich Mussulmans. An eminent Arabian merchant informed Mr. Niebuhr, that the guard was posted for no other purpose than to keep off the populace, who had begun to throw dirt upon the tomb, which they afterwards scraped off, and preserved as a sort of relic: 176 miles N. Mecca. Lon. 57. 10 E. Lat. 25. 0 N.

MEDINA, a town of Spain, in Old Castile: twelve miles N. Frias.

MEDINA-DE-LAS-TORRES, a very ancient town of Spain, in Estramadura, with an old castle, and the title of a duchy. It is seated on the confines of Andalusia, at the foot of a mountain near Badajoz.

MEDINA-DEL-CAMPO, a large, rich, and ancient town of Spain, in the kingdom of Leon. The great square is very fine, and adorned with a superb fountain. It is a trading place, enjoys great privileges, and is seated in a country abounding with corn and wine. Lon. 4. 20 W. Lat. 41. 22 N.

MEDINA-DEL-RIO-SECCO, an ancient and rich town of Spain, in the kingdom of Leon, with the title of a duchy; seated on a plain, where there are fine pastures. Lon. 4. 33 E. Lat. 42. 8 N.

MEDINENSIS VENA. (*Medinensis*, because said to be common at Medina, and *vena*, a whim or sport, it having been long doubtful whether it were an animal or no.) Dracunculus. Gordius medinensis of Linnéus. The hair-worm: a very singular animal which in Guinea and some other countries inhabits the cellular membrane, between the skin and muscles. See GORDIUS.

MEDIO'CRITY. *s.* (*mediocrité*, French.) 1. Moderate degree; middle rate (*Wotton*). 2. Moderation; temperance (*Hooker*).

MEDIOLANUM, an ancient city, the capital of the Insubres, built by the Gauls on their settlement in that part of Italy. A municipium, and a place of great strength. The seat of the liberal arts; whence it had the name of Novæ Athenæ. Now Milan, capital of the Milanese, situated on the rivers Olana and Lombro. Lon. 9. 30 E. Lat. 45. 25 N.

MEDIOLANUM AULERCORUM, in ancient geography, a town of Gallia Celtica, which afterwards took the name of the Eburovicum Civitas (Antonine); corrupted to Civitas Ebroicorum, and this last to Ebroica; whence the modern appellation of Evreux, a city of Normandy. Lon. 1. 12 N. Lat. 49. 21 N.

MEDIOLANUM GUGERNORUM, in ancient geography, a town of Gallia Belgica; now the village Moyland, not far from Cologne.

MEDIOLANUM ORDOVICUM, in ancient geography, a town of Britain, now Llan Vethlin, a market-town in Montgomeryshire, in Wales.

*To* ME'DITATE. *v. a.* (*meditor*, Latin.) 1. To plan; to scheme; to contrive (*Dryden*). 2. To think on; to revolve in the mind (*Spenser*).

*To* ME'DITATE. *v. n.* To think; to muse; to contemplate (*Taylor*).

MEDITA'TION. *s.* (*meditatio*, Latin.) 1. Deep thought; close attention; contrivance; contemplation (*Bentley*). 2. Thought employed upon sacred objects (*Spenser*). 3. A series of thoughts, occasioned by any object or occurrence.

ME'DITATIVE. *a.* (from *meditate.*) 1. Addicted to meditation (*Ainsworth*). 2. Expressing intention or design.

MEDITERRANEAN, something inclosed within land; or that is remote from the ocean.

MEDITERRANEAN, is more particularly used to signify that large sea which flows between the continents of Europe and Africa, entering by the straits of Gibraltar, and reaching into Asia, as far as the Euxine sea and the Palus Mæotis. The Mediterranean was anciently called the Grecian sea and the Great sea. It is now cantoned out into several divisions, which bear several names. To the west of Italy it is called the Ligustic or Tuscan sea; near Venice, the Adriatic; towards Greece, the Ionic and Ægean; between the Hellespont

and the Bosphorus, the White sea, as being very safe; and beyond, the Black sea, its navigation being dangerous. The British trade carried on by means of the Mediterranean sea is of the last consequence to Great Britain; and the permanent preservation thereof depends upon the possession of the town and fortification of Gibraltar.

The counterfeiting of Mediterranean passes for ships to the coast of Barbary, &c. or the seal of the admiralty-office to such passes, is felony without benefit of clergy. Stat. 4 Geo. II. c. 18.

MEDITRINALIA, a Roman festival in honour of the goddess Meditrina, kept on the 30th of September. Both the deity and the festival were so called *à medendo*, because on this day they began to drink new wine mixed with old by way of medicine.

MEDITULLIUM. (*meditullium*, from *medius*, the middle.) See DIPLOE.

ME'DIUM. *s.* (*medium*, Latin.) 1. Any thing intervening (*Bacon*). 2. Any thing used in ratiocination, in order to a conclusion (*Baker*). 3. The middle place or degree; the just temperature between extremes (*L'Estr.*).

MEDIUM, in logic, the mean or middle term of a syllogism, being an argument, reason, or consideration, for which we affirm or deny any thing: or, it is the cause why the greater extreme is affirmed or denied of the less in the conclusion.

MEDIUM, in arithmetic, or arithmetical medium, or mean, called in the schools, medium rei, that which is equally distant from each extreme, or which exceeds the lesser extreme as much as it is exceeded by the greater, in respect of quantity not of proportion: thus 9 is a medium between 6 and 12. See PROPORTION.

MEDIUM (Geometrical), called in the schools medium personæ, is that where the same ratio is preserved between the first and second, as between the second and third terms, or that which exceeds in the same ratio, or quota of itself, as it is exceeded: thus 6 is a geometrical medium between 4 and 9.

MEDIUM, in philosophy, that space or region through which a body in motion passes to any point; thus æther is supposed to be the medium through which the heavenly bodies move; air, the medium wherein bodies move near our earth; water, the medium wherein fishes live and move; and glass is also a medium of light, as it affords it a free passage. That density or consistence in the parts of the medium, whereby the motion of bodies in it is retarded, is called the resistance of the medium, which together with the force of gravity, is the cause of the cessation of the motion of projectiles.

MEDIUM (Subtle or Æthereal). See ÆTHER.

MEDLAR, in botany. See MESPILUS.

*To* ME'DLE. *To* MEDLY. *v. a.* To mingle (*Spenser*).

ME'DLEY. *s.* (from *meddle* for *mingle.*) A mixture; a miscellany; a mingled mass (*Walsh*).

ME'DLEY. *a.* Mingled; confused (*Dryden*).

MEDUA, a town of the kingdom of Algiers, seated in a country abounding in corn, fruits, and flocks of sheep, 175 miles S.W. of Algiers. Lon. 0. 13 E. Lat. 34. 45 N.

MEDULLA. (*medulla, quasi in medio ossis.*) The marrow. (See MARROW.) The pith or pulp of vegetables.

MEDULLA OBLONGATA. The medullary substance of the same use as the cerebrum, that lies within the cranium, upon the basillary process of the occipital bone. It is formed by the connection of the crura cerebri and crura cerebelli, and terminates in the spinal marrow. It has several eminences, viz. pons varolii, corpora pyramidalia, and corpora olivaria

MEDULLA SPINALIS. The spinal marrow. A continuation of the medulla oblongata, which descends into the specus vertebralis from the foramen magnum occipitale, to the third vertebra of the loins, where it terminates in a number of nerves, which, from their resemblance, are called *cauda equina.* The spinal marrow is composed, like the brain, of a cortical and medullary substance: the former is placed internally. It is covered by a continuation of the dura mater, pia mater, and tunica arachnoidea. The use of the spinal marrow is to give off, through the lateral or intervertebral foramina, thirty pairs of nerves, called cervical, dorsal, lumbar, and sacral nerves.

MEDULLARY. (*medullaris*, from *medulla*, marrow.) Marrow-like.

MEDULLARY SUBSTANCE. The white and internal substance of the brain is so called

MEDUSA, in fabulous history, the eldest daughter of Ceto and the sea-god Phorcus, went with her two sisters to inhabit the isle of Gorgons, from which name they were called the Gorgons. Neptune falling in love with Medusa, chiefly on account of the beauty of her hair, carried her off, and took her to the temple of Minerva, where he debauched her; when Minerva being enraged at the profanation of her temple, transformed Medusa's hair into snakes, and caused those who looked at her to be turned to stone. But Perseus being furnished with Mercury's winged shoes, and the sword with which he had killed Argus, attacked Medusa, and cut off her head, and from her blood sprung up Pegasus and Chrysaor. The conqueror placed Medusa's head on the ægis of Minerva, which he had used in his expedition; and the head still retained the same petrifying powers as before.

MEDUSA, in zoology, a genus of the class vermes, order mollusca. Body gelatinous, orbicular, and generally flat underneath; mouth central, beneath. The gelatinous mass constituting the body is of a different figure, furnished with arms or tentacular processes proceeding from the lower surface; the larger species when touched cause a slight tingling and redness, and are usually denominated sea-nettles. They are supposed to constitute the chief food of cetaceous mammals, and most of them shine with great splendour in the water. Forty-four

species; the greater number with a smooth body, a few with ciliate ribs on the body. They are scattered over the waters of the globe; ten of them common to our own coasts. Some contract into the shape of a pigeon's egg; others into the resemblance of an apple, of a nutmeg, or of half a cherry: the colour is generally blueish, reddish, or yellowish brown; texture usually transparent or hyaline. Some of them are very splendid in the water; especially M. noctiluca, an inhabitant of the Atlantic and Mediterranean seas; it wanders in large groupes, illuminating the water; and if shaken in sea-water they emit considerable sparks of light.

MEDUSA'S HEAD, in botany. See EUPHORBIA.

MEDUSULA, in botany, a genus of the class cryptogamia, order fungi. Fungus solid, globular, spissitate, crowded; seeds external, filiform, flexile, colliquescent. One species only; M. labyrinthica, an exotic.

MEDWAY, a river which rises in Ashdown forest, in Sussex; entering Kent, it waters Tunbridge, and at Maidstone is navigable to Rochester; below which, at Chatham, it is a station for the royal navy. Dividing into two branches, the western one enters the Thames, between the isles of Grain and Shepey, and is defended by the fort at Sheerness. The eastern branch, called the East Swale, passes by Queenborough and Milton, and falls into the German ocean, below Feversham.

MEDWI, a town of Sweden, in E. Gothland, called the Swedish Spa, on account of its waters, which are vitriolic and sulphureous. The lodging houses form one street of uniform wooden buildings painted red. The walks and rides are delightful, particularly on the banks of the Wetter. It is three miles from Wadstena.

MEDZIBOZ, a town of Poland, in the palatinate of Volhinia, seated on the river Bog: 20 miles S. of Constantinow.

MEED. *s.* (meꝺ, Saxon.) 1. Reward; recompence (*Milton*). 2. Present; gift (*Shakspeare*).

MEEK. *a.* (*minkr*, Islandic.) Mild of temper; not proud; not rough; soft; gentle (*Milton*).

*To* ME'EKEN. *v. a.* (from *meek*.) To make meek; to soften (*Thomson*).

ME'EKLY. *ad.* (from *meek*.) Mildly; gently.

ME'EKNESS. *s.* (from *meek*.) Gentleness; mildness; softness of temper (*Atterbury*).

MEER. *a.* (See MERE.) Simple; unmixed.

MEER. *s.* (See MERE.) A lake; a boundary.

ME'ERED. *a.* Relating to a boundary (*Shakspeare*).

MEEREN, or MEER (John Vander), called the *Old*, an esteemed painter, was born in 1627; but the master under whom he learned the art of painting is not mentioned. His genius directed him to choose for his subjects sea-pieces, landscapes, and views of the sea and its shores; which he painted with great truth, as he had accustomed himself to sketch every scene after nature. The situations of his landscapes are agreeably chosen, frequently they are solemn, and generally pleasing. The forms of his trees are easy and natural, his distances well observed, and the whole scenery has a striking effect, by a happy opposition of his lights and shadows. He also very often painted battles in such a style as met with approbation; as they showed good composition, were touched with spirit, and had a great deal of transparence in the colouring. But the fault imputable to Vander Meer is, that in some of his pictures the back-grounds are a little too blue, and that some of his landscapes have a tint which appears rather too yellow. He died in 1690.

MEEREN, or MEER (John Vander), called *De Jonghe*, an eminent landscape-painter, is supposed to have been the son of the old John Vander Meer, and of whom he learned the first rudiments of the art; but being in his youth deprived of his instructor before he had made any great progress, he became a disciple of Nicholas Berghem, and was accounted the best of those who were educated in the school of that admired master. In the manner of his master, he painted landscapes and cattle; and his usual subjects are cottages, with peasants at their rural occupations and diversions. It is observed of him, that he very rarely introduced cows, horses, or any other species of animals, except goats and sheep; the latter of which are so highly finished, that one would imagine the wool might be felt by the softness of its appearance. His touch is scarce perceptible, and yet the colours are admirably united. He died in 1688. The genuine works of this Vander Meer bear a very high price, and are esteemed even in Italy, where they are admitted into the best collections; but the scarcity of them has occasioned many moderate copies after his works to be passed on the undiscerning for real originals.

MEERSCHAUM. Wern. Ecume de Mer. Broch. Keffekil. Kirw. In mineralogy, a genus of the class earths, order siliceous. Colour yellowish-white, passing to Isabella yellow, greyish or reddish; massy; dull; fracture fine-grained, earthy, passing into flat, conchoidal, or small slates; specific gravity 1.6.

Found in the Crimea, and exported in great quantities to Constantinople, under the name of Keffekil, or earth of Kaffa, from the name of the town in the Crimea whence it is shipped; and used by the Turkish women instead of soap, or fuller's earth; used also for the bowls of the Turkish pipes. Found likewise in Natolia and the islands Samos and Negropont in the Archipelogo. A variety of it found at Castel del Piano near Sienna, and formed by Fabroni into bricks so light as to float upon the water, thus restoring one of the lost arts recorded by Strabo and Pliny.

MEET. *a.* (of obscure etymology.) 1. Fit; proper; qualified (*Whitgift*). 2. MEET *with.* Even with (*Shakspeare*).

*To* MEET. *v. a.* pret. I *met*; I have *met*; part. *met.* (meꞇan, Saxon, to find.) 1. To

come face to face; to encounter (*Shakspeare*). 2. To encounter in hostility (*Milton*). 3. To encounter unexpectedly (*Milton*). 4. To join another in the same place (*Shakspeare*). 5. To close one with another (*Addison*). 6. To find; to light on (*Pope*).

*To* MEET. *v. n.* 1. To encounter; to close face to face. 2. To encounter in hostility (*Dryden*). 3. To assemble; to come together (*Tillotson*). 4. *To* MEET *with.* To light on; to find. 5. *To* MEET *with.* To join (*Shakspeare*). 6. *To* MEET *with.* To suffer unexpectedly (*Shakspeare*). 7. To encounter; to engage (*Rowe*). 8. To obviate. A latinism (*Bacon*). 9. To advance half way (*South*). 10. To unite; to join.

MEETER. *s.* (from *meet.*) One that accosts another (*Shakspeare*).

MEETING. *s.* (from *meet.*) 1. An assembly; a convention (*Spratt*). 2. An interview (*Shakspeare*). 3. An assembly of dissenters. 4. A conflux: as, *the* meeting *of two rivers.*

MEETING-HOUSE. *s.* (*meeting* and *house.*) Place where dissenters assemble to worship (*Addison*).

MEETLY. *ad.* (from the adj.) Fitly; properly.

MEETNESS. *s.* Fitness; propriety.

MEGÆRA, in fabulous history, one of the furies, who, according to the poets, were the daughters of Acheron and Night.

MEGARA, a town of Livadea, formerly very large, but now inconsiderable. It has some fine remains of antiquity, and is 20 miles W. of Athens. Lon. 23. 30 E. Lat. 38. 6 N.

MEGATHERIUM. Mammoth. In zoology, a genus of the class mammalia, order bruta. It has a near resemblance to the elephant, but having never been found alive, nor even with its organs in a perfect state after death, we are not able to give its generic characters very accurately. From some late accounts received from St. Petersburg, it is supposed by some that the animal is still in existence, its carcase having been found nearly fresh, though it has never been seen actually alive. Its residence appears to have been confined to a line in the northern hemisphere, extending from Siberia to the banks of the Ohio; and the name of mammoth was first given to the dug-up skeleton of the animal by Siberian peasants.

The following account, received from St. Petersburgh, is the fullest and most accurate that has hitherto been published, and relates to a specimen found, not indeed alive, but complete, and in a state of nearly perfect preservation.

Schoumachoff, a Tungoose chief, about the end of August 1799, when the fishing in the river Lena was over, repaired according to annual custom to the sea-side. Leaving his family in their huts, he coasted along the shore in quest of mammoth's tusks, and one day perceived in the midst of a rock of ice a large shapeless block, not at all resembling the logs of drift wood commonly found there. He climbed the rock, and examined it all round, but could not ascertain what it was. The next year, visiting the same spot, he found there the carcase of a seacow (*trichecus rosmarus*); and observed, not only that the mass he had seen the year before was freer from ice, but that there were two similar pieces by the side of it. These afterwards turned out to be the feet of the mammoth. In 1801, the side of the animal and one of its tusks appearing very distinctly, he acquainted his wife and some of his friends with what he had found. This however gave them great alarm, for the old men said, that they had been told by their forefathers a similar monster was once before seen in those parts, and the whole family of the person who discovered it soon became extinct. At this Schoumachoff was so much alarmed, that he fell sick. On his recovery, however, he could not relinquish the expectation of the profit he might make of the tusks; and directed his servants to conceal the circumstance carefully, and endeavour to keep away all strangers by some pretext or other. It was not till the fifth year, that the ice had melted sufficiently to disengage the mammoth, when it fell over on its side upon a bank of sand. Schoumachoff then cut off the tusks, which he bartered for goods to the value of 50 rubles (11l. 5s.) with a Russian merchant. Being satisfied with this, the carcase was left to be devoured by the bears, wolves, and foxes, except what the Yakouts in the neighbourhood cut off to feed their dogs. Previous to this, indeed, he had a rude drawing made of it, which represents it with pointed ears, very small eyes, horse's hoofs, and a bristly mane extending along the whole of its back. In this it has the appearance of something between a pig and an elephant.

In 1806, Mr. Mich. Adams, of Petersburg, being at Yakoutsk, fortunately heard of this circumstance, and repaired to the spot. When he arrived there, the skeleton, nearly stripped of its flesh, was entire, one of the fore-feet excepted. The vertebræ, from the head to the os coccygis, one of the shoulderblades, the pelvis, and the remaining three extremities, were still held firmly together by the ligaments of the joints, and by strips of skin and flesh. The head was covered with a dry skin. One of the ears, well preserved, was furnished with a tuft of bristles. These parts could not avoid receiving some injury during their removal to Petersburg, a distance of 11000 wersts [6875 miles]: the eyes however are preserved, and the pupil of the left eye is still distinguishable. The tip of the under lip was eaten away; and the upper being destroyed, the teeth were exposed. The brain, which was still within the cranium, appeared dry. The parts least damaged were one of the fore-feet and one of the hind: these were still covered with skin, and had the sole attached to them.

According to the Tungoose chief the animal was so corpulent and well fed, that its belly hung down below the knee joints. It was a male, with a long mane, but had neither tail nor trunk. From the structure of the os coccygis however, Mr. Adams is persuaded, that it had a short thick tail: and from the small-

ness of its snout, and the size of its tusks, he conceives it could not have been able to feed without the assistance of a proboscis; but Schoumachoff persisted in the assertion, that he never saw any appearance of a trunk, and it does not appear probable, that even his rude draughtsman would have omitted such a striking feature. The skin, three-fourths of which are in possession of Mr. Adams, the part that lay on the ground having been preserved, was of a deep gray colour, and covered with reddish hair and black bristles. These, from the dampness of the ground, had lost some part of their elasticity. More than a poud [40lbs.] weight of them, that had been trodden into the ground by the bears, was collected, many of them an archine [2 feet 4 in.] long. What remained of the skin was so heavy, that ten persons found great difficulty in carrying it to the seaside, in order to stretch it on logs of wood. The head weighs $11\frac{1}{2}$ pouds [460 lbs.]; the two horns, each of which is $1\frac{1}{2}$ toise [$9\frac{1}{2}$ feet] long, weigh 10 pouds [400lbs.]; and the entire animal measured $4\frac{1}{2}$ archines [$10\frac{1}{2}$ feet] high, by 7 [$16\frac{1}{2}$ feet] long. Mr. Adams has seen tusks of the mammoth so curved as to form three-fourths of a circle; and one at Yakoutsk $2\frac{1}{2}$ toises [15 feet 9 in.] long, an archine [2 feet 4 in.] thick near the root, and weighing 7 pouds [280 lbs.]. They are curved in the direction opposite to those of the elephant, bending towards the body of the animal; and the point is always more or less worn on the outside, so that the right tusk is easily distinguishable from the left. He adds, that he found a great quantity of amber on the shores.

In America this animal, or one so nearly resembling it, as probably to be only a distinct species of the same genus, has only been found in a fossil state; and generally only particular parts or bones of the animal have been discovered in one place, though other parts have often been traced at no great distance. This has frequently occurred near the lakes of Canada, where the animal is called by the savages, the father of oxen; near the rivers which fall into the Ohio; towards the rivers Miami, Muskingum, in the state of Kentucky, and of Tennessee, &c. &c. but principally near the salt springs, where pieces of skeletons and tusks have been found, of an astonishing length and weight.

A femur and a tibia have been found, which, when united, must have been five feet and a half high; another femur, which was alone five feet long, and 36 inches in circumference in its middle or cylindrical part; ivory tusks resembling those of an elephant, which were near seven feet long, and one foot six or eight inches in circumference at the base. Doctor Barton and doctor Wislar, of Philadelphia, have in their possession the lower jaw almost entire, with two teeth on either side, in particular, that of the former has five and three points, all quite double; but no one had the entire head.

The state of New York (in the environs of the beautiful river Hudson) has of late years been the theatre of discoveries of the fossil bones, apparently of the same animal, a greater quantity of them having been found there than any where else. In 1800, by digging in the low and marshy places of the counties of Orange and Ulster, at three, four, and five feet deep, parts, which had never before been discovered, were found. Some bones, ten feet deep in the earth, were as sound and entire as those which had been met with nearer the surface. Some, however, were found broken, particularly those of the head.

In another place, eight miles from the city of New York, an upper jaw was found perforated to receive a tusk like that of an elephant; the connection of the tusks was by *gomphosis*; the tusks were evidently of ivory; the openings for the nostrils were eight inches in diameter; and notwithstanding that the bones of the feet afford reason to conclude that the animal had claws, it is scarcely possible to avoid thinking, from the structure of the head, that it was a species of elephant. Some hair has even been found, three inches in length and of a dark colour, which is said to have belonged to this monstrous quadruped, and seems very considerably to assimilate it to the mammoth of Siberia; though M. Cuvier inclines to believe that the two animals constituted different genera, the tusks of the Siberian animal exhibiting more of a genuine elephant or ivory structure, and less sharpness in its grinders.

In the year 1801, Mr. William Peale, proprietor of the museum at Philadelphia, succeeded in obtaining a skeleton so nearly complete, as by the addition of one or two defective bones obtained from the fossile remains of other animals of the same kind, to render it perfect. This skeleton was brought over to England by the son of the discoverer, and publicly exhibited in 1803; the writer of the present article examined it minutely, and from actual measurement, and the information of the proprietor, is able to give the following detail. The skeleton was dug up in a morass in the county of Orange, state of New York, about 60 miles N.N.W. from the city of this name, where it was accidentally discovered by farmers who were digging shell marle for manure. The skeleton measured eleven feet high, seventeen and a half long, and five feet eight inches wide: the under jaw alone weighed sixty-three pounds, and the whole skeleton about a thousand pounds. The tusks were different in form and substance from those of the elephant; the spinous processes over the shoulders were prodigiously large and ridgy, so that the back must have been sharp like that of the hog; the ribs were short, narrow, and placed edgewise, and altogether unlike those of the elephant, which are broad and flat; the tail, unlike that of the Siberian mammoth, appeared to have been long, broad, and flat; the scapulæ were unlike those of other animals. The Philosophical Society of Philadelphia is in possession of a skeleton in some degree more perfect.

The generic name of Megatherium was first bestowed upon this animal by M. Cuvier, who appears accurately to have examined its skele-

ton: and to this generic name he added the trivial name of Americanum, to distinguish the individual from which his observations was made. In Dr. Shaw it occurs under the name of Manis Megatherium.

The following is M. Cuvier's description.

"This skeleton is fossil. It was found a hundred feet beneath the surface of a sandy soil in the vicinity of the river of La Plata. It only wants the tail, and some pair-bones, which have been imitated in wood; and the skeleton is now mounted at Madrid. This skeleton is twelve feet (French) long, by six feet in height. The spine is composed of seven cervical, sixteen dorsal, and four lumbar vertebræ: it has consequently sixteen ribs. The sacrum is short: the ossa illia very broad; and their plane being almost perpendicular to the spine they form a very open pelvis. There is no pubis or ischium: at least they are wanting in this skeleton, and there is no mark of their having existed when the animal was alive.

"The thigh bones are excessively thick, and the leg bones still more so in proportion. The entire sole of the foot bore on the ground in walking. The shoulder-blade is much broader than long. The clavicles are perfect, and the bones of the fore-arm are distinct and moveable upon each other. The fore limbs are longer than the hind. To judge by the form of the last phalanxes, there must have been very long pointed claws, enclosed at their origin in a long sheath. There appears to have been only three of these claws on the fore-feet, and a single one on the hind. The other toes seem to have been deprived of them, and perhaps entirely concealed beneath the skin.

"The head is the greatest singularity of this skeleton. The occiput is elongated and flattened, but it is pretty convex above the eyes. The two jaws form a considerable projection, but without teeth, all grinders, with a flat crown and grooved across. The breadth of the branches of the lower jaw, and the great apophysis placed on the base of the zygomatic arch deserve particular notice.

"This quadruped in its character, taken together, differs from all known animals: and each of its bones considered apart, also differs from the corresponding bones of all known animals. This results from a detailed comparison of the skeleton with that of other animals, and will readily appear to those who are conversant in such researches: for none of the animals which approach it in bulk have either pointed claws, or similarly formed head, shoulder-blades, clavicle, pelvis or limbs.

"As to its place in the system of quadrupeds, it is perfectly marked by the sole inspection of the ordinary indicatory characters, that is, the claws and teeth. These show that it must be classed in the family of unguiculated quadrupeds destitute of cutting teeth; and in fact it has striking relations with those animals in all parts of its body. This family is composed of the Sloth (Bradypus), Armadillo (Dasypus), Pangolin (Manis), Ant-eater (Myrmecophagus), and Cape Ant-eater (Orycteropus).

"The great thickness of the branches of the lower jaw, surpassing even that of the elephant, seems to prove that this vast animal was not content with leaves, but like the elephant and rhinoceros, broke n ground the branches themselves; its close and flat-crowned teeth appearing very proper for that purpose. The position of the bones of the nose having some analogy with that of the elephant and tapir would induce a suspicion that our animal wore a trunk, but it must have been very short, since the length of the head and neck together only equals that of the fore legs. However this be, we find, in the absence of canine teeth, and the shortness of the muzzle, sufficient characters to constitute a new genus in the family of the edentated, which ought to be placed between the sloth and the armadillo; since to the shape of the head of the former it joins the teeth of the latter. It would be necessary to know particulars of which a skeleton cannot inform us, such as the nature of the teguments, the form of the tongue, the position of the mammæ, &c. in order to determine to which of these it approached the most.

"This adds to the numerous facts which apprise us that the animals of the ancient world were all different from those we now see on the earth: for it is scarcely probable that if this animal still existed, so remarkable a species would have hitherto escaped the researches of the naturalists. It is also a new and very strong proof of the invincible laws of the subordination of characters, and the justness of the consequences thereon deduced for the classification of organized bodies: and under both these views it is one of the most valuable discoveries which have for a long time been made in natural history."

MEGEN, a town of Dutch Brabant, seated on the Maese, 15 miles S.W. of Nimeguen. Lon. 5. 26 E. Lat. 51. 49 N.

MEGESVAR, a town of Transylvania, capital of a county of the same name, remarkable for its good wines. It is seated on the river Kotel. Lon. 25. 20 E. Lat. 46. 50 N.

MEGIERS, a town of Transylvania, 28 miles N. of Hermanstadt. Lon. 24. 41 E. Lat. 46. 53 N.

MEGRIM. *s.* (from *hemicrany.*) Disorder of the head.

MEHEGAN (William Alexander), a French historian, but of Irish extraction, was born at Salle, in the Cevennes, in 1721. He wrote, 1. The Origin of the Guebres; 2. Considerations on the Revolutions of Arts; 3. The Origin and Progress of Idolatry; 4. A Picture of Modern History, which has been translated into English, and is the best of his works. He died in 1766.

MEHRAN, the principal of the channels into which the river Indus divides itself, near Tatta, in Hindustan Proper.

MEHUN-SUR-YEVRE, an ancient town of France, in the department of Cher. Here are ruins of a castle built by Charles VII, as a place of retirement; and here he starved himself, in the dread of being poisoned by his son,

afterwards Lewis XI. It is seated in a fertile plain, on the river Yevre, 10 miles N.W. of Bourges, and 105 S. of Paris. Lon. 2. 17 E. Lat. 47. 10 N.

MEHUN-SUR-LOIRE, a town of France, in the department of Loiret, seated on the Loire, 10 miles S.W. of Orleans. Lon. 1. 48 E. Lat. 47. 50 N.

MEIBOMIUS (John Henry), professor of physic at Helmstadt, and first physician at Lubec. He wrote a work entitled Mæcenas, sive de C. Cilnii Mæcenatis Vita, Moribus et Rebus gestis, 1653. He died in 1655, aged 65.

MEIBOMIUS (Henry), son of the above, was born at Lubec in 1638, and educated at the university of Helmstadt, where in 1664 he obtained a professorship. He died in 1700. He wrote several medical works, and published, in three vols. folio, Scriptores Rerum Germanicarum.

MEIBOMIUS (Marcus), a learned man of the same family as the preceding, who published, in 1652, a Collection of seven Greek authors, with a Latin version by himself. He also wrote a treatise on Ancient Music, and some other works. He died in 1710.

MEIBOMIUS'S GLANDS. In anatomy, the small glands which are situated between the conjunctive membrane of the eyelid; first discovered by the elder Meibomius.

MEINAU, an island in the bay of the Bodmer Sea, or middle lake of Constance, one mile in circumference. It belongs to the knights of the Teutonic order, and produces excellent wine, which forms the chief revenue of the commander. It is five miles N. of Constance.

MEIER (George Frederic), a German writer, born in Saxony in 1718. He wrote wholly in German, not learning any other language. His principal works are, 1. Instructions how one may become a Modern Philosopher; 2. Introduction to the elegant Arts and Sciences. He died in 1777.

*To* MEINE. *v. a.* To mingle (*Ainsworth*).

MEINUNGEN, a town of Franconia, situate amid mountains, on the river Werra, 14 miles N.W. of Hilburghausen, and 21 N. of Schweinfurt. Lon. 10. 26 E. Lat. 50. 36 N.

ME'INY. *s.* (menızu, Saxon). A retinue; domestic servants (*Shakespeare*).

MEISSAU, a town of the archduchy of Austria, 14 miles S.S.W. of Znaim, and 34 N.W. of Vienna. Lon. 16. 7 E. Lat. 48. 30 N.

MEISSEN, or MISNIA, a margravate of Germany, in the electorate of Saxony, 100 miles long and 80 broad; bounded on the N. by the duchy of Saxony, on the E. by Lusatia, on the S. by Bohemia, and on the W. by Thuringia. It is a very fine country, producing corn, wine, metals, and all the conveniencies of life. The inhabitants speak the purest language in Germany. The capital is Dresden.

MEISSENHEIM, a town of Germany, in the duchy of Deux Ponts, situate on the Glan, 28 miles N. of Deux Ponts, and 30 W.S.W. of Mentz. Lon. 7. 22 E. Lat. 49. 42 N.

MEL. (*mel*). See HONEY.

MEL ACETATUM. Honey of vinegar. This preparation of honey and vinegar possesses aperient and expectorating virtues, and is given, with these intentions, in the cure of humoral asthma, and other diseases of the chest.

MEL ROSÆ. Honey of roses, an admirable preparation for the base of various gargles and collutories. It may also be employed with advantage, mixed with extract of bark or other medicines, for children who have a natural disgust to medicines.

MEL SCILLÆ. Honey of squills. Aperient, expectorant, and detergent virtues, are attributed to the honey of squills.

MELA (Pomponius), an old Latin writer, was a native of Spain, and flourished A.D. 45. His geographical work, entitled, De Situ Orbis, is extant, and was published by Isaac Vossius in 1658, 4to. James Gronovius also gave an edition of this valuable work in the same year, 12mo.

MELÆNA. (*melæna*, μελαινα, from μελας, black.) In medicine, the black vomit. Black bile.

MELALINCA, in botany, a genus of the class polyadelphia, order polyandria. Calyx five-parted, half superior; petals five; filaments numerous, united into five bodies; style one; capsule half-inverted by the calyx; three-celled. Twelve species; the greater number with alternate leaves, a few with opposite; almost all plants of Australasia, a few of India: the chief is M. leucadendron. Cajeput or Caja-puti-tree. Leaves alternate, lanceolate, pointed, oblique in a falcate manner, five-nerved; branchlets and petioles glabrous. It is a native of the East Indies, with a black trunk, and white leaves and branches; flowers sessile. From it is distilled the green aromatic oil, known by the name of cajeput or caju-puti; for which see the article CAJEPUT.

MELAMPO'DIUM. Black hellebore. In botany, a genus of the class syngenesia, order polygamia necessaria. Receptacle chaffy, conic; seeds crowned with a heart-shaped, involute converging scale; calyx five-leaved. Three species; natives of the West Indies and South America. The plant, under the name of helleborus niger, is still an article in many dispensatories. See HELLEBORUS NIGER.

MELAMPUS, in fabulous history, a celebrated soothsayer and physician of Argos, son of Amythaon and Idomenea, or Dorippe. He lived at Pylos, in Peloponnesus, and received his prophetic knowledge from two young serpents, as he lay asleep. Apollo also instructed him in the art of medicine, and he cured the daughters of Prœtus with hellebore (See PRŒTIDES). He also obtained the oxen of Iphiclus for his brother Bias, who thereby obtained in marriage Pero, the daughter of Neleus. This he did by teaching Iphiclus how to become a father. A severe distemper, which had rendered the women of Argos insane, was totally removed by Melampus, and Anaxagorus, who then sat on the throne, rewarded his merit, by giving him part of his kingdom, where he es-

stablished himself, and where his posterity reigned during six successive generations. He received divine honours after death, and temples were raised to his memory.

MELAMPYRUM. Cow wheat. In botany, a genus of the class didynamia, order angiospermia. Calyx tubular, four-cleft; upper lip of the corol compressed, with the margin turned back; capsule two-celled, oblique, opening at one edge; seeds two, gibbous. Seven species: one a native of Carolina, the rest European plants; of which four are common to the woods or corn-fields of our own country: and yield an excellent food for cattle, though they are apt to give a bitter taste to the butter made from their milk afterwards.

MELANAGOGES. (from μελας, black, and αγω, to expel). Medicines which purge off black bile.

MELANCHO'LIA. (*melancholia*, μελαγχολια, from μελας, black, and χολη, bile; because the ancients supposed that it proceeded from a redundance of black bile). Melancholy madness. A disease in the class neuroses and order vesaniæ of Cullen, characterized by erroneous judgment, but not merely respecting health, from imaginary perceptions or recollections influencing the conduct, and depressing the mind with ill-grounded fears; not combined with either pyrexia or comatose affections; often appearing without dyspepsia, yet attended with costiveness, chiefly in persons of rigid fibres and torpid insensibility. See MEDICINE.

MELANCHO'LIC. *a.* (from *melancholy*). 1. Disordered with melancholy; fanciful; hypochondrical; gloomy (*Clarendon*). 2. Unhappy; unfortunate (*Clarendon*).

ME'LANCHOLY. *s.* (from μελανος and χολη.) 1. A kind of madness, in which the mind is always fixed on one object (*Shakspeare*). 2. A gloomy, pensive, discontented temper (*Taylor*).

ME'LANCHOLY. *a.* (*melancholique*, Fr.) 1. Gloomy; dismal (*Denham*). 2. Diseased with melancholy; fanciful; habitually dejected (*Locke*.)

MELANCHOLY THISTLE. See CARDUUS.

MELANCHOLY TREE. See NYCTANTHES.

MELANCTHON (Philip), born at Bretten in the Palatinate, in 1495, was one of the wisest and most able men of his age among the reformers, though of a mild temper, and disposed to accommodate rather than to inflame disputes. In his youth he made an admirable progress in learning, and was made Greek professor at Wirtemberg in 1509. Here his lectures upon Homer, and the Greek text of St. Paul's Epistle to Titus, drew to him a great number of auditors, and entirely effaced the contempt to which his low stature and mean appearance had exposed him. Melancthon reduced the sciences to systems; and acquired such reputation, that he had sometimes 2500 auditors. He soon entered into an intimate friendship with Luther, who taught divinity in the same university; and in 1519 they went together to Leipsic, to dispute with Eccius. The following years he was continually engaged in various employments; he composed several books; he taught divinity; took several journeys in order to found colleges and visit churches; and in 1530 drew up a confession of faith, which goes by the name of the Confession of Augsburg, because it was presented to the emperor at the diet held in that city. All Europe was convinced that he was not, like Luther, backward to accommodate the differences between the various sects of Christians. He hated religious disputes, and was drawn into them only through the necessity of the part he was called to act in the world; and therefore would have sacrificed many things to have produced an union among the protestants. For this reason, Francis I. the French king, wrote to desire him to come and confer with the doctors of the Sorbonne, in order to agree with them about putting an end to all controversies; but though Luther endeavoured to persuade the elector of Saxony to consent to that journey, and though Melancthon himself desired it, that prince, whether he distrusted Melancthon's moderation, or was afraid of quarrelling with the emperor Charles V. would never grant his permission. The king of England also in vain desired to see him. Melancthon, in 1529, assisted at the conferences of Spires. In 1541 he was at the famous conferences at Ratisbon. In 1543 he went to meet the archbishop of Cologn to assist him in introducing the reformation into his diocese: but that project came to nothing; and in 1548 he assisted at seven conferences on the subject of the Interim of Charles V. and wrote a censure on that Interim and all the writings presented at these conferences. He was extremely affected at the dissensions raised by Flaccus Illyricus. His last conference with those of the Roman communion was at Worms in 1557. He died at Wittemburg in 1560, and was interred near Luther. Some days before he died he wrote upon a piece of paper the reasons which made him look upon death as a happiness; and the chief of them was, that it "delivered him from theological persecutions." Nature had given Melancthon a peaceable temper, which was but ill suited to the time he was to live in. His moderation served only to be his cross. He was like a lamb in the midst of wolves. Nobody liked his mildness; it looked as if he was lukewarm; and even Luther himself was sometimes angry at it.

Melancthon was a man in whom many good as well as great qualities were wonderfully united. He had great parts, great learning, great sweetness of temper, moderation, contentedness, and the like, which would have made him very happy in any other times than those in which he lived. He never affected dignities, or honours, or riches, but was rather negligent of all these things; too much so in the opinion of some, considering he had a family: and his son-in-law Sabinus, who was of a more ambitious make, was actually at variance with

him upon this very article. Learning was infinitely obliged to him on many accounts; on none more than this, that, as already observed, he reduced almost all the sciences, which had been taught before in a vague irregular manner, into systems. Considering the distractions of his life, and the infinity of disputes and tumults in which he was engaged, it is astonishing how he could find leisure to write so many books. Their number is prodigious, insomuch that it was thought necessary to publish a chronological catalogue of them in the year 1582. His works indeed are not correct, and he himself owned it; but as he found them useful, he chose rather to print a great number than to finish only a few; "which however (as Bayle says), was postponing his own glory to the advantage of others." His constitution was very weak, and required great tenderness and management; which made Luther, as hot and zealous as he was, blame him for labouring too earnestly in the vineyard.

MELANIPPUS, a son of Astapus, one of the Theban chiefs who defended the gates of Thebes against the army of Adrastus, king of Argos. He was opposed by Tydeus, whom he slightly wounded. He was killed by Amphiaraus, who carried his head to Tydeus. Tydeus, to take revenge of the wound he had received, bit the head with such barbarity, that he swallowed the brains, and Minerva, offended with his conduct, took away the herb which she had given him to cure his wound, and he died.—2. A son of Mars, who became enamoured of Cometho, a priestess of Diana Triclaria. He concealed himself in the temple, and ravished his mistress, for which violation of the sanctity of the place, the two lovers soon after perished by a sudden death.

MELANOPIPER. See Piper nigrum.

MELANTHIUM, in botany, a genus of the class hexandria, order trigynia. Calyx-less; corol three-petalled; filaments from the elongated claws of the corol. Fourteen species, chiefly natives of the Cape; a few of North America; one of Siberia.

MELANTHUS, Melanthes, or Melanthius, a son of Andropompus. He was driven from his paternal kingdom by the Heraclidæ, and came to Athens, where Thymœtes resigned the crown to him, provided he fought a battle against Xanthus, a general of the Bœotians. He fought and conquered, and his family, surnamed the Meleidæ, sat on the throne of Athens, till the age of Codrus.

MELAS. (*melas*, from μελας, black.) Vitiligo nigra. Morphæa nigra. Lepra maculosa nigra. A disease that appears upon the skin in black or brown spots, which very frequently penetrate deep, even to the bone, and do not give any pain or uneasiness. It is very frequent in, and endemial to, Arabia, where it is supposed to be produced by a peculiar miasm.

MELASIS, in entomology, a Fabrician tribe of the genus Hispa, which see.

MELASMA. (*melasma*, μελασμος, from μελας, black). Melasmus. A disease that appears not unfrequently upon the tibia of aged persons, in form of a livid black spot, which, in a day or two, degenerates into a very foul ulcer.

MELASSES. See Treacle.

MELASTOMA. American gooseberry. In botany, a genus of the class decandria, order monogynia. Calyx five-cleft, campanulate; petals five, inserted into the calyx; berry five-celled, covered with the calyx. Eighty-five species; nearly all natives of the West Indies or America; a few of India. Shrubs with leaves beautifully variegated with gold, white, yellow, and russet colour; on which account several species are introduced into our green-houses, and propagated by cuttings, which succeeds better than by seeds. They may be thus subdivided:

A. With twelve stamens.
B. With ten stamens; leaves doubly nerved.
C. With ten stamens; leaves trifly nerved.
D. With ten stamens; leaves quintuply nerved.
E. With eight stamens; leaves trifly nerved
F. With eight stamens; leaves quintuply nerved.

MELAZZO, an ancient town of Natolia, with a bishop's see, and some curious monuments of antiquity. It is seated on a bay of the Archipelago, 60 miles S. of Smyrna. Lon. 27. 25 E. Lat. 37. 28 N.

MELCHISEDEC, or Melchizedek, king of Salem, and priest of the Most High. The scripture tells us nothing either of his father, or of his mother, or of his genealogy, or of his birth, or of his death. And in this sense he was a figure of Jesus Christ, as St. Paul affirms, who is a priest for ever, according to the order of Melchisedec, and not according to the order of Aaron, whose original, life, and death, are known. When Abraham returned from pursuing the four confederate kings, who had defeated the kings of Sodom and Gomorrah, and had taken away Lot, Abraham's nephew, along with them, Gen. xiv. 17, 18, 19, &c., Melchisedec came to meet Abraham as far as the valley of Shaveh, which was afterwards named the king's valley, presented him with the refreshment of bread and wine, (or he offered bread and wine in sacrifice to the Lord; for he was a priest of the most high God), and blessed him. Abraham, being desirous to acknowledge him in the quality of priest of the Lord, offered him the tythes of all he had taken from the enemy. After this time there is no mention made of the person of Melchisedec; only the Psalmist, (cx. 4.) speaking of the Messiah, says, "Thou art a priest for ever after the order of Melchisedec." St. Paul, in his Epistle to the Hebrews, unfolds the mystery which is concealed in what is said of Melchisedec in the Old Testament. See Heb. v. 6.—10.

MELCHITES, in ecclesiastical history, were those Christians in Syria, Egypt, and the Levant, who, in the seventh century, though not Greeks, followed the doctrines and ceremonies of the Greek church. They were

called *melechites*, i. e. royalists, from the Hebrew *melech*, king, by their adversaries, by way of reproach, on account of their implicit submission to the edict of the emperor Marcian, in favour of the council of Chalcedon. For the same reason the emperor Justinian had the epithet Chalcedonensis given him.

MELCHIZEDECHIANS, or MELCHISEDEKIANS, ancient sectaries, so called, because they raised Melchizedec above all creatures, and even above Jesus Christ.

The author of this sect was one Theodotus; whence the Melchizedechians become more commonly known by the name of Theodotians; all the difference between those and the strict Theodotians consisting in that particular article relating to Melchizedech, who, according to them, was the great and supreme virtue.

MELCOMB-REGIS, a seaport town of England, in the county of Dorset, situated at the mouth of the river Wey, which parts it from Weymouth. It is a borough town, and sends two members to the British parliament, which privilege it had before Weymouth. It was appointed a staple, in the reign of Edward III., and in the next reign the French burnt it, and it was thereby rendered so desolate a place, that the remaining inhabitants prayed, and obtained a discharge from customs. On account of its quarrels with Weymouth, in the reign of Henry VI., its privileges as a port were removed to Pool; but in that of queen Elizabeth they were restored to it by act of parliament, which was confirmed in the next reign, on condition that Melcomb and Weymouth should make but one corporation, and enjoy their privileges in common; and to this was owing the flourishing state of both. In the two reigns last mentioned a wooden bridge with seventeen arches was built from hence to Weymouth; to which, as well as its church, the chief contributors were certain citizens of London; and upon its decay it was rebuilt in 1770. Here is a good market-place and town-hall, to which the members of the corporation of Weymouth come to attend public business, as the inhabitants do to its church for public worship. For several years past the sea has retired from it on the east, the priory formerly being bounded by the sea; but there is now a street beyond it, from which it is several paces to the high-water mark. The priory was situated in the east part of the town, in Maiden-street, whose site occupied about an acre, now covered with tenements. On the south side are the remains of the chapel, now converted into a malt-house. Near it are the remains of an ancient building, formerly a nunnery. Here are three meeting-houses, and a work-house for the poor. The church, which is in the middle of the town, has a wooden turret for a bell, and had been an old chapel. It was rebuilt in 1605, and made parochial, and is a handsome fabric, with a beautiful altar-piece painted and given by sir James Thornhill. The port, which generally goes by the name of Weymouth, is said to be the best frequented in the county, and is defended by Sandford and Portland castles. The markets for both towns are Tuesdays and Fridays, but there are no fairs. Melcomb-Regis is reckoned bigger, more thriving and populous than Weymouth. They are both but one corporation and borough, consisting of a mayor, recorder, two bailiffs, an uncertain number of aldermen, and twenty-four capital burgesses. Whoever has been a mayor is ever after an alderman. They send four burgesses to parliament, who are elected by such as have freeholds, whether they inhabit here or not; and the number of voters is near 700. Every elector, as in London, has the privilege of voting for four persons, who when chosen are returned, in two distinct indentures, as the burgesses of Weymouth and the burgesses of Melcomb-Regis.

MELEAGER, in fabulous history, a celebrated hero of antiquity, son of Œneus, king of Ætolia. The Parcæ were present at the moment of his birth, and predicted his future greatness. Atropos declared he should live as long as a firebrand then on the fire remained unconsumed. Althæa, his mother, no sooner heard this, than she snatched the stick from the fire, and kept it with the most jealous care. Meleager signalized himself in the Argonautic expedition, and afterwards delivered his country from the neighbouring inhabitants; but what contributed most to his glory was, his killing the celebrated Caledonian boar, which laid waste all the country. Several, however, of the princes and chiefs of Greece assisted at this hunt, so remarkable in ancient mythology. The conqueror gave the skin and the head to Atalanta, who had first wounded the animal. This irritated Toxeus and Plexippus, the brothers of Althæa, and they endeavoured to rob Atalanta of the present. Meleager defended a woman, of whom he was enamoured, and killed his uncles in the attempt. Mean time Althæa was going to the temple of the gods to return thanks for the victory which her son had gained, and in her way met the corpses of her brothers, and at this mournful spectacle she filled the whole city with her lamentations. Being then informed that they had been killed by Meleager, she, in the moment of resentment, threw into the fire the fatal stick, on which her son's life depended, and Meleager died as soon as it was consumed. 2. There were many others of this name, the most remarkable of whom is a Greek poet in the reign of Seleucus, the last of the Seleucidæ. He was born at Tyre, and died at Cos. It is to his well-directed labours that we are indebted for the *anthologia*, or collection of Greek epigrams, which he selected from forty-six of the best and most esteemed poets.

MELEAGRIDES, the sisters of Meleager, daughters of Œneus and Althæa. They were so disconsolate at the death of their brother Meleager, that they refused all aliments, and were, at the point of death, changed into birds

called Meleagrides. The youngest of the sisters Gorge and Dejanira, who had been married, escaped this metamorphosis.

MELEAGRIS. Turkey. In zoology, a genus of the class aves, order gallinæ. Bill conic, incurvate; head covered with spongy caruncles; chin with a longitudinal, membranous caruncle; tail broad, expansile; legs spurred. Two species.

1. M. gallipavo. Common turkey. Front and chin carunculate; breast of the male tufted; female spurless. Inhabits America; above three feet and a half long; is domesticated every where, and varies much in its colours: in a wild state lives in woods, and feeds on nuts, acorns, and various insects; roosts on the highest trees, is very irascible, and impatient of any thing red: the cock struts with an inflated breast, expanded tail, red face, and relaxed frontal caruncle, and makes an extraordinary internal noise, which, while uttered, shakes the whole body: eggs numerous, white, with reddish or yellow spots; tail-feathers eighteen.

It has been doubted by some ornithologists whether this bird be of American origin. Buffon, however, seems to have settled the question. Indeed the vast numbers which were found to people the forests of that continent when first discovered afford a strong presumption in favour of this opinion. Dulestre observes, that they were then also observed in prodigious abundance in the West-Indies, where, without any care, they produced three broods every year; a strong proof of their being in their native country, where all animals are most thriving and prolific. Among the Ilinois, the Jesuits affirm that they were seen in flocks of two hundred, and of such a large size that they weighed from thirty to forty pounds. It is farther remarkable, that in America the turkies swarm every where in their wild state; preserving, however, a sufficient distance from the settlements of the European colonists who have begun to occupy that country.

To this evidence, resulting from the abundance of these birds in America, we may add that of all those travellers who have visited Asia, who unanimously agree that they are very rare upon that continent. Chardin and Tavernier, who have travelled over all the East, positively assert that there is none of them in that vast country, except those that have been imported by Europeans; and that where they have been introduced by strangers they have seldom thriven. This is nearly the state of the case with regard to the turkeys that are found on different parts of the African coast. They were first imported thither, along with the common poultry, by the Portuguese; and have since been reared by the other nations who have made settlements on that continent.

No ancient writer, nor any naturalist of modern times, has mentioned turkeys till after the discovery of America; a circumstance from which we may fairly infer, that, till that great event, these birds were unknown in every other part of the world. Into England they were not introduced till the reign of Henry VIII.; a period which corresponds exactly with that in which they might be supposed to be imported by some of the first adventurers from the new world. The turkey, therefore, is a native of America; and, being a bird of heavy flight, it is probable that, without the assistance of man, it could never have made its way into any part of the ancient continent.

The turkey has been supposed a bastard progeny from the peacock and common poultry, from the name *gallo pavo*, that was originally given it when introduced into Europe. This opinion is altogether overthrown, if it be admitted that its origin has been in America; for thither the common cock never made his way till conveyed by the Europeans. The peacock also being of Persian extraction, could not, otherwise, have found his way thither.

The turkey, in its wild state, is characterized by the same stupidity that attends it in captivity. The wild ones are about twice the size of our domestic turkey; and their flesh is said to be harder and tougher. As this bird has been a much shorter period in domestication, so its varieties are greatly fewer. The tufted kind seems only a variety of the common turkey, with hardly any peculiarity, excepting the large crest of feathers above the head.

This genus has been domesticated almost as universally as the common poultry since the discovery of America; but before that period it was altogether unknown in the old world. The turkey was first introduced into Britain and France about the year 1521, immediately after the conquest of Mexico by Cortes. Ælian mentions a bird found in India that some writers have supposed to be the turkey; but those who are acquainted with that country universally agree that this genus is no where found wild in that part of the world. The distinguishing characteristics of this genus are, the naked and tuberous flesh which covers the head, and part of the neck; and a long fleshy appendage which hangs from the base of the upper mandible, and which is capable of great distension when the bird is under any agitation. There are several varieties of the turkey, which are probably constantly increasing in number by domestication. In their wild state turkeys are much larger, more hardy, and beautiful, than in captivity. The turkey, which with us is so tender when young, multiplies abundantly in the large forests of Canada, which a great part of the year are covered with snow. There it is generally of a dark grey colour, and its feathers are elegantly bordered at the edges with a bright yellow. In almost every part of America and the West-Indies turkies are found wild, and in such abundance that they constitute a great part of the food of the natives, although never reduced by them into a state of domestication. Their feathers are woven into cloaks, fans, and um-

brellas: but the improvident savages never think of taking into keeping a bird from which they might be supplied with plenty on every emergency. They seem to take a delight in precarious possession: and, as a great part of the pleasure of the chase lies in the uncertainty of the pursuit, they are unwilling to abridge those labours, which they deem equally honourable and delightful. Hunting the turkey is, therefore, one of the principal amusements of the savage; as its flesh constitutes often the chief support of his family. The manner in which he hunts it is this: he is supplied with a faithful rough dog, supposed to be the wolf domesticated; and when, by the assistance of this guide, he discovers a flock, the dog is immediately dispatched in pursuit. At first the turkeys merely by running far outstrip the dog, who nevertheless continues the pursuit, knowing from experience that they are incapable of running for any length of time at full speed. Accordingly, he soon overtakes them, when, already exhausted with fatigue, they take the trees for shelter: there they perch, incapable of flying farther, till they are, one after another, knocked down with a stick. Such is their stupidity, that when an European comes upon a flock of them in the woods, and kills one by discharging his piece, the rest seldom take their flight till a great number be destroyed.

The turkey is not so fertile, or so powerfully influenced by the sexual passion, as the common cock: he has, accordingly, less courage, and less jealousy. Four or five females are sufficient for one male. If more be placed together, they will indeed fight; but not with the same violence or effect as the common cock, who has often been observed to attack the turkey, though twice his size, and to put an end to his life. Nor are subjects of quarrel wanting to incense these different species against each other: for it is asserted that the turkey-cock, when deprived of his females, will apply to the common hens.

2. M. satyra. Horned turkey. Head with two horns; body red, with eye-like spots: nostrils, front, and area of the eyes covered with black, hair-like feathers; horns callous, blue, bent back; caruncle of the chin dilatable, blue, varied with rufous; legs whitish, spurred; tail-feathers twenty. Female: head covered with feathers, hornless, and without gular caruncle; feathers of the head and upper part of the neck black-blue, long, decumbent; rest of the body, as in the male, red, with eye-like spots; spurs more obtuse. Inhabits India: something less than the common turkey.

MELES. In zoology. See URSUS.

MELESETIS, a river of Asia Minor, in Ionia, near Smyrna. Some of the ancients supposed that Homer was born on its banks, from which circumstance they call him Melesigenes, and his compositions Meletææ chartæ. It is even supported that he composed his poems in a cave near the source of that river.

MELIA. Bead-tree. In botany, a genus of the class decandria, order monogynia. Calyx five-toothed, petals five; nectary cylindric, toothed, bearing the anthers in its throat; drupe with a five-celled nut. Four species; three natives of India, one of Jamaica. The species most worthy of notice is M. azedarach; leaves doubly pinnate, with about five smooth leaflets; an indigenous tree of Syria and Ceylon, rising about twenty feet high, with nuts that are bored and strung for beads by the Catholics. The pulp surrounding the nuts is poisonous.

MELIANTHUS. Locust. Honey-flower. In botany, a genus of the class didynamia; order angiospermia. Calyx five-leaved; the lower leaflet gibbous; petals four, with the nectary beneath the lowest; capsule four-celled. Three species: all Cape shrubs, with alternate, unequally-pinnate leaves on a winged petiole; flowers in spikes, tinged with green, saffron-colour and red: the leaves and flowers are highly beautiful, and worthy of cultivation in our conservatories. They flower in June; and are best propagated by cuttings or layers, the seeds seldom maturating in England. M. major, if shaken while in flower, discharges a shower of nectar.

ME'LICA. Melic-grass, rope-grass. In botany, a genus of the class triandria; order digynia. Calyx two-valved, mostly two-flowered, with an imperfect flower between them; corol two-valved. Nine species; natives of Europe, the Cape, or South America: three common to the woods, mountains, or bogs of our own country. Some writers make the species more numerous, but it is only by admitting several which more properly belong to the genus EHRHARTA, which see. The species most worthy of notice is M. nutans, with beardless petals; contracted panicle, pointing one way, nearly simple; flowers pendulous; calyx two-flowered. It grows wild on our mountains, and is employed in the Hebrides as a material for ropes for fishing-nets, as the fibres will long remain in the water without rotting.

MELICERIS. (μελικηρις, a tumor, or abscess, inclosed in a cystis, consisting of matter not unlike honey; whence its name.) The meliceris is otherwise called atheroma. It gathers without pain, and gives way upon pressure, but returns again: it is to be cured by warm discutients.

MELICERTA, in fabulous history, a son of Athamas and Ino, was saved by his mother from the fury of his father, who prepared to dash him against a wall, as he had done his brother Learchus. The mother was so terrified that she threw herself into the sea, with Melicerta in her arms. Neptune had compassion on the misfortunes of Ino and her son, and changed them into sea deities. Ino was called Leucothoe, or Matuta, and Melicerta was known among the Greeks by the name of Palæmon, and among the Latins by that of Portumnus.

MELICO'CCA. In botany, a genus of the class octandria, order monogynia. Calyx four-parted; petals four, reflected beneath the

calyx; stigma somewhat peltate; drupe covered with a bark. One species: a branched tree of South America, with terminal racemes.

MELI'COPE. In botany, a genus of the class octandria, order monogynia. Calyx four-parted; corol four-petalled; nectary four double glands surrounding the germs; capsules four, one-seeded. One species: a native of Polynesia.

MELI'CYTUS. In botany, a genus of the class diœcia, order pentandria. Calyx five-toothed; petals five; nectaries five scales. Male: filaments fixed to the inside of the nectary. Female: stigma flat, four or five-lobed; capsule berried, one-celled; seeds imbedded in the pulp. One species: a native of New Zealand.

MELIDA, an island in the Adriatic, by many supposed to be the island in which St. Paul landed in his voyage to Rome, and where he was bitten by a viper: thirty-two miles long and four wide. Lon. 35. 30 E. Lat. 43. 5 N.

MELILOT. In botany, a name for the trifolium indicum of Linnéus. See TRIFOLIUM and MELILOTUS.

MELILO'TUS. (*melilotus*, μελιλωτος, from μελι, honey, and λωτος, the lotus, so called from its smell, being like that of honey.) *Locus sylvestris. Trifolium odoratum* Melilot. This plant, *trifolium melilotus officinalis* of Linnéus, has been said to be resolvent, emollient, anodyne, and to participate of the virtues of camomile. Its taste is unpleasant, subacrid, subsaline, but not bitter; when fresh it has scarcely any smell; in drying it acquires a pretty strong one of the aromatic kind, but not agreeable. The principal use of melilot has been in clysters, fomentations, and other external applications.

MELINDA, a kingdom on the east coast of Africa, situated, according to some, between the third and fourth degree of south latitude; though there is great disagreement among geographers as to its extent. It is allowed by all, however, that the coasts are very dangerous; being full of rocks and shelves, and the sea at some seasons very liable to tempests. The kingdom of Melinda is for the most part rich and fertile; producing almost all the necessaries of life except wheat and rice, both which are brought thither from Cambaya and other parts; and those who cannot purchase them make use of potatoes in their stead, which are here fine, large, and in great plenty. They likewise abound with great variety of fruit-trees, roots, plants, and other esculents, and with melons of exquisite taste. They have also great plenty of venison, game, oxen, sheep, hens, geese, and other poultry, &c. and one breed of sheep, whose tails weigh between 30 and 40 pounds. The capital city is also called Melinda. It is seated at the mouth of the Quilmanci. Lon. 39. 38 E. Lat. 2. 15 S.

*To* ME'LIORATE. *v. a.* (*meliorer*, Fr. from *melior*, Latin.) To better; to improve (*South*).

MELIORA'TION. *s.* (*melioration*, Fr.) Improvement; act of bettering (*Bacon*).

MELIO'RITY. *s.* (from *melior*, Latin.) State of being better (*Bacon.*)

MELISSA, a daughter of Melissus, king of Crete, who, with her sister Amalthæa, fed Jupiter with the milk of goats. She first found out the means of collecting honey, whence some have imagined that she was changed into a bee, as her name is the Greek word for that insect. 2. One of the Oceanides, who married Inachus, by whom she had Phoroneus and Ægialeus.

MELISSA. Balm, or baum. In botany, a genus of the class didynamia, gymnospermia. Calyx dry, flattish above; the upper lip somewhat flat-topped; corol with the upper lip slightly vaulted, cloven; lower lip with the middle of the lobe heart-shaped. Five species, all natives of the South of Europe: the two following are the chief.

1. M. officinalis. Common balm. Whorls reaching half way round; bractes oblong, pedicelled; leaves ovate, acute, serrate; flowers whitish. In its recent state it has a roughish aromatic taste, and a pleasant lemon-like odour. It was formerly much esteemed in nervous diseases, hysteric and hypocondriacal affections; but at present it is only used as a grateful diluent tea in fevers, and other inflammatory affections.

2. M. cretica. Calaminth. Racemes terminal; peduncles solitary, very short. Under the name of calamintha this plant is still an article in some dispensatories. See CALAMINTHA.

MELISSUS of Samos, a Greek philosopher, was the son of Rhagines and the disciple of Parmenides; and lived about 440 B. C. He pretended that the universe is infinite, immoveable, and without a vacuum. Themistocles was among his pupils.

MELITE, or MELITA, (anc. geog.), an island referred to Africa by Scylax and Ptolemy; but nearer Sicily, and allotted to it by the Romans: commended for its commodious harbours; for a city well built, with artificers of every kind, especially weavers of fine linen; all owing to the Phœnicians the first colonists.

It was for a long time supposed by Christians in general, and is still believed by the inhabitants of Malta, and would be heresy to say any thing else in that place, that Malta is the island which in the 27th chapter of the Acts of the Apostles is called Melita. But this is a mistake. The island is in the Adriatic sea, on the coast of Dalmatia, and now known by the name of Melida. That Paul was shipwrecked on this island appears, 1st. From the nature of the wind by which the ship was driven; and which was a south-east wind. 2dly, From the words of Luke, " As we were driven up and down in Adria." 3dly, From the nature of the coast. It was sandy, and of gradual ascent, which description is found to correspond with the coast of Melida but not of Malta. 4thly, From the nature of the in-

habitants. They were barbarians. But this could not well be said of Malta; an island colonized by Greeks and Romans. 5thly, From the natural history of the island. Vipers have been found in Melida, but not in Malta. So that Melida corresponds to the scriptural account in every particular, and Malta not in any. For if Malta be the island on which Paul was shipwrecked, he must have been driven southward by a south-east wind; or the Adriatic sea must be in the Mediterranean; the ship must have struck in the cleft of a rock; the inhabitants of an island colonized by Greeks and Romans must have been barbarians; and the Apostle must have been bit by a viper in an island where there was no viper to bite him.

MELITTIS. Bastard balm. In botany, a genus of the class didynamia, order gymnospermia. Calyx unequal, wider than the tube of the corol; corol with the upper lip flat; lower lip three-lobed, crenate; anthers cohering crosswise. Three species; one a native of Japan, two of the woods of England.

MELITUS, a poet and orator of Athens, of mean and insidious character, who became one of the principal accusers of Socrates. He, together with the other accusers, were afterwards condemned and put to death.

*To* MELL. *v. n.* (*meler*, French.) To mix; to meddle. (Obsolete).

MELLI'FEROUS. *a.* Productive of honey.

MELLIFICA'TION. *s.* (*mellifico*, Latin.) The art or practice of making honey (*Arb.*).

MELLI'FLUENCE. *s.* (*mel* and *fluo*, Lat.) A honied flow; a flow of sweetness.

MELLI'FLUENT. MELLI'FLUOUS. *a.* (*mel* and *fluo*, Latin.) Flowing with honey (*Shakspeare*).

MELLINGEN, a town of Switzerland, in the bailiwic of Baden, which, since 1712, depends on the cantons of Zuric and Bern. It is seated in a fertile country, on the river Reufs, five miles S. by W. of Baden.

MELLINUS, in the entomology of Fabricius, a tribe of the genus VESPER, which see.

MELLITES. Mellite. Mellilite. Honeystone. Mullat of alumina. Honeystein. (*Wern.*) In mineralogy, a genus of the class inflammables. Soft, brittle, pellucid, shining with a glossy lustre, of a conchoidal texture, and honey-yellow colour; in the form of a double four-sided pyramid with the faces quite smooth. Found near Arturn in Saxony, between layers of wood-coal, and in Switzerland imbedded in asphalt; in colour, texture, and transparency resembling the honey-yellow amber, from which it principally differs in crystallizing as above; when heated it whitens, and burns in the open air without odour, and without being sensibly charged, leaving a white residuum which at first has no taste, but at length produces an acid impression on the tongue: fracture conchoidal, or indeterminate; specific gravity 1.666.

ME'LLOW. *a.* (meappa, soft, Saxon.) 1. Soft with ripeness; full ripe (*Digby.*) 2. Soft in sound (*Dryden*). 3. Soft; unctuous (*Bacon*). 4. Drunk; melted down with drink (*Roscommon*).

*To* ME'LLOW. *v. a.* (from the adjective.) 1. To ripen; to mature; to soften by ripeness; to ripen by age (*Addison*). 2. To soften (*Mort.*). 3. To mature to perfection (*Dryd.*).

*To* ME'LLOW. *v. n.* To be matured; to ripen (*Donne*).

ME'LLOWNESS. *s.* (from *mellow.*) 1. Maturity of fruits; ripeness; softness by maturity (*Digby*). 2. Maturity; full age.

MELMOTH (William, Esq.), a learned and worthy bencher of Lincoln's Inn, was born in 1666. In conjunction with Mr. Peere Williams, Mr. Melmoth was the publisher of Vernon's Reports, under an order of the court of chancery. He had once an intention of printing his own Reports; and a short time before his death advertised them at the end of those of his coadjutor Peere Williams, as then actually preparing for the press. They have, however, not yet made their appearance. But the performance for which he justly deserves to be held in perpetual remembrance is, The Great Importance of a Religious Life; concerning which it may be mentioned, to the credit of the age, that notwithstanding many large editions had before been circulated, 42,000 copies of this useful treatise have been sold in the last 20 years. It is a somewhat singular circumstance, that the real author of this most admirable treatise should never before have been publicly known (it having been commonly attributed to the first earl of Egmont, and particularly by Mr. Walpole in his catalogue); which is the more surprising, as the author is plainly pointed out in the following short character prefixed to the book itself: "It may add weight, perhaps, to the reflections contained in the following pages, to inform the reader, that the author's life was one uniform exemplar of those precepts which, with so generous a zeal, and such an elegant and affecting simplicity of style, he endeavours to recommend to general practice. He died on the 6th day of April 1743, and lies buried under the cloister of Lincoln's Inn chapel. MEM. PAT. OPT. MER. FIL. DIC." The son, by whom his character has been drawn, is William Melmoth, Esq. the translator of Pliny and of Cicero's Letters; and author of those which pass under the name of sir Thomas Fitzosborne.

MELOCHIA. Jew's mallow. Calyx often double; petals five, spreading; filaments subulate; styles five; capsule five-celled, one-seeded. Fourteen species: natives of the East or West Indies. The chief species is M. corchorifolia, with sessile flowers in heads; roundish capsules; leaves somewhat cordate, slightly lobed. It is a native of India and Palestine: and is a common pot-herb among the Jews of the latter country.

MELODI'NUS. In botany, a genus of the class pentandria, order digynia. Corol twisted, with the throat crowned; berry two-

celled, many-seeded. One species only, a scandent shrub of Australasia, nearly resembling a Rauwolfia.

MELO'DIOUS. *a.* (from *melody.*) Musical; harmonious (*Milton*).

MELO'DIOUSLY. *ad.* (from *melodious.*) Musically; harmoniously.

MELO'DIOUSNESS. *s.* (from *melodious.*) Harmoniousness; musicalness.

MELODY. (μελωδια, compounded of μελι, *honey*, and ωδη, *singing.*) In music, is the agreeable effect of different musical sounds, ranged or disposed in a proper succession.

Melody is the effect only of one single part, voice, or instrument; by which it is distinguished from harmony; though in common speech, these two are frequently confounded.

Harmony is properly the agreeable result of the union of two or more concording musical sounds heard in consonance, *i. e.* at one and the same time; so that harmony is the effect of two parts at least: as therefore a continued succession of musical sounds produces melody, so does a continued combination of these produce harmony.

MELOE. Blossom-eater. In zoology, a genus of the class insecta; order coleoptera. Antennas moniliform; thorax roundish; head inflected, gibbous; shells soft, flexile. Thirty-six species; four of them common to our own country, the rest distributed over the globe. They may be thus subdivided:

A. Wingless: shells abbreviated.

B. Winged; shells as long as the abdomen.

α. Jaw horny, bifid; containing twenty-six species, and constituting the tribe Mylabris of Fabricius.

β. Jaw linear, entire; containing four species; and comprising the Cercroma of Fabricius.

The following are chiefly worthy of notice:

1. M. proscarabæus; oil-beetle. Entirely blue-black or dark-violet; head broad; thorax narrower than the head; shells very short and oval; abdomen long; the female thrice as large as the male. A native of Europe; and frequently found in the middle of spring in our own fields and pastures creeping slowly, the body appearing so distended with eggs as to cause the insect to move with difficulty. When touched it exudes a yellowish moisture from its pores, which was formerly celebrated for its supposed efficacy in rheumatic pains, applied to the parts affected with the disease in the form of an embrocation.

2. M. variegatus. Dull green; thorax edged with red; shells punctured; antennas purple; body large, above variegated with red, green, and copper, beneath and legs purple. Inhabits Europe.

The officinal cantharis, or Spanish-fly, was, till of late, supposed to be a meloe, and is now generally so arranged in our pharmacopœias: minuter observation, however, has established it to be a LYTTA, under which name it will be found described.

MELOLONTHA, in the Fabrician system of entomology, a tribe of the genus scarabæus, or beetle. See SCARABÆUS.

MELON. In botany. See CUCUMIS.

MELON-WATER. See CUCURBITA and CITRULLUS.

MELON-THISTLE. See CACTUS.

MELOPE'PO. In botany. See CUCURBITA.

MELOPŒIA. (Greek.) A term in the ancient music signifying the art, or rules, of composition in melody. Aristides Quintilian divides the melopœia into three kinds: the hypatoides, so called from the gravity of the sounds to which it was confined; the mesoides, consisting of the middle sounds; and the netoides, formed of the acute sounds. These were again divisible into other kinds, or distinctions; as the erotic, or amorous; the comic; and the encomiastic: also into the systaltic, or mournful, tender, and affecting strain; the diastaltic, or noble, bold, and exhilarating air; and the euchastic, which was between these, and calculated to calm and assuage the passions.

MELOS (anc. geog.), an island between Crete and Peloponnesus, about 24 miles from Scyllæum. It is about 60 miles in circumference, and of an oblong figure. It enjoyed its independence for about 700 years before the time of the Peloponnesian war. This island was originally peopled by a Lacedemonian colony, 1116 years before the Christian era. For this reason the inhabitants refused to join the rest of the islands and the Athenians against the Peloponnesians. This refusal was severely punished. The Athenians took Melos, and put to the sword all such as were able to bear arms. The women and children were made slaves, and the island left desolate. An Athenian colony repeopled it, till Lysander reconquered it and re-established the original inhabitants in their possessions.

MELO'THRIA. In botany, a genus of the class triandria, order monogynia. Calyx five-cleft; corol campanulate, one-petalled; berry three-celled, many-seeded. One species: a native plant of America, with creeping roots, striking out afresh at every joint. The flowers are melon-shaped, but small, of a pale yellow colour; they are succeeded by a fruit of the size of a pea, which when ripe is black; before which time they are often pickled by the inhabitants. With us it is a stove-plant, and the fruit is much smaller.

MELPOMENE, in fabulous history, one of the Muses, daughter of Jupiter and Mnemosyne. She presided over tragedy. Horace has addressed the finest of his odes to her, as to the patroness of lyric poetry. She was generally represented as a young woman with a serious countenance. Her garments were splendid, she wore a buskin, and held a dagger in one hand, and in the other a sceptre and crown.

MELROSE, a town of Scotland, in the county of Selkirk, and on the confines of Tweeddale, seated on the south side of the river

Tweed; with an ancient abbey now in ruins. W. lon. 2. 42. N. lat. 55. 38. This abbey was founded by king David I. in 1136. He peopled it with Cistertians brought from Rivale abbey in Yorkshire, and dedicated it to the Virgin Mary. At the Reformation James Douglas was appointed commendator, who took down much of the building, in order to furnish materials for a large house to himself, which still remains, and is dated 1590. Nothing is left of the abbey excepting a part of the cloister walls elegantly carved; but the ruins of the church are of most uncommon beauty. Part is at present used for divine service, the rest uncovered; but every part does great honour to the architect.—Alexander II. was buried beneath the great altar, and it is also the place of interment of the Douglases and other potent families.—Its situation is extremely pleasant.

MELT. *s.* A name given to the spleen of some animals.

*To* MELT. *v. a.* (meltan, Saxon.) 1. To dissolve; to make liquid (*Locke*). 2. To dissolve; to break in pieces (*Burnet*). 3. To soften to love or tenderness (*Addison*). 4. To waste away (*Shakspeare*).

*To* MELT. *v. n.* 1. To become liquid; to dissolve (*Dryden*). 2. To be softened to pity, or any gentle passion; to grow tender, mild, or gentle (*Shakspeare*). 3. To be dissolved; to lose substance (*Shakspeare*). 4. To be subdued by affliction (*Psalms*).

ME'LTER. *s.* One that melts metals (*Sid.*).

ME'LTINGLY. *ad.* (from *melting.*) Like something melting (*Sidney*).

MELTON-MOWBRAY, a town of Leicestershire, 108 miles from London. It is a large well-built place, in a fertile soil; with a market on Tuesday, the most considerable for cattle of any in this part of the island. It is almost encompassed with a little river called the Eye, over which it has two fine bridges; and has a large handsome church, with a free-school. Here are frequent horse-races, and three fairs in the year. Lon. 0. 50 W. Lat. 52. 48 N.

MELUN, an ancient town of France, in the department of Seine and Marne, seated on the Seine, 25 miles SE. of Paris. Lon. 2. 35 E. Lat. 48. 30 N.

MELUNDY. See SUNDERDOO.

MELYRIS. In zoology, a genus of the class insecta, order coleoptera. Antennas entirely perfoliate; head inflected under the thorax; thorax margined; lip clavate, emarginate; jaw one-toothed, pointed. Three species; one, M. viridi, green, shells rough, with three raised lines, black antennas, and small round sentel, a native of the Cape. The habitation of the other two unknown; they have only been seen as dried specimens in museums.

ME'MBER. *s.* (*membre*, Fr. *membrum*, Latin.) 1. A limb; a part appendant to the body. 2. A part of a discourse or period; a head; a clause (*Watts*). 3. Any part of an integral (*Addison*). 4. One of a community (*Addison*).

MEMBRACIS, in the Fabrician system of entomology, a tribe of the genus CICADA, which see.

MEMBRA'NA HYALOIDEA. Membrana arachnoidea. In anatomy, the transparent membrane which includes the vitreous humour of the eye.

MEMBRA'NA PUPILLA'RIS. In anatomy, a very delicate membrane of a thin and vascular texture, and an ash colour, arising from the internal margin of the iris, and totally covering the pupil in a fœtus of six months.

MEMBRA'NA RUYSCHIA'NA. The celebrated anatomist Ruysch discovered that the choroid membrane of the eye was composed of two laminæ. He gave the name of membrana ruyschiana to the internal lamina, leaving the old name of choroides to the external.

MEMBRA'NA TY'MPANI. The membrane covering the cavity of the tympanum, and separating it from the meatus auditorius externus. It is of an oval form, convex below the middle, towards the hollow of the tympanum, and concave towards the meatus auditorius, and convex above the middle towards the meatus, and concave towards the hollow of the tympanum. According to the observations of anatomists, it consists of six laminæ; the first and most external is a production of the epidermis, the second is a production of the skin lining the auditory passage: the third is cellular membrane, in which the vessels form an elegant net-work; the fourth is shining, thin, and transparent, arising from the periosteum of the meatus; the fifth is cellular membrane, with a plexus of vessels like the third; and the sixth lamina, which is the innermost, comes from the periosteum of the cavity of the tympanum. This membrane, thus composed of several laminæ, has lately been discovered to possess muscular fibres.

MEMBRANA'CEOUS. In botany, of the substance of parchment. A membranaceous stipule; as in arenaria rubra. Membranaceous valvule. Membranaceous calyx, petiole; flatted like the leaf itself. Membranaceous leaf: having no distinguishable pulp between the two surfaces.

MEMBRANALOGIA. (*membranalogia*, from *membrana*, a membrane, and λογος, a discourse.) Membranology. The doctrine of the common integuments and membranes. This word is a bad compound; being formed of two distinct languages.

MEMBRANATE, in botany, applied to the stem. A membraned stem. Complanatus more folii. Flattened like a leaf.

MEMBRANE. (*membrana.*) A thin expanded substance, composed of cellular texture, whose elastic fibres are so arranged and woven together, as to allow of great pliability. The membranes of the body are various, as the skin, peritoneum, pleura, dura mater, &c. &c.

MEMECYLON, in botany, a genus of the class octandria, order monogynia. Calyx superior, with a striate bottom, and very entire margin; corol four petalled; anthers inserted into the side of the tip of the filament; berry

crowned with a cylindrical calyx. Five species; all trees of India.

MEMEL, a strong town of Eastern Prussia, with a castle, the finest harbour in the Baltic, and an extensive commerce. It is seated on the N. extremity of the Curische Haf, an inlet of the Baltic 70 miles in length, which is here joined to the sea by a narrow strait. On the N.E. side of the entrance into the harbour is a lighthouse, erected in 1796. It is 76 miles N.N.E. of Konigsberg, and 140 N.E. of Dantzic. Lon. 21. 40 E. Lat. 55. 46 N.

MEME'NTO. *s.* (Lat.) A memorial notice; a hint to awaken the memory (*Bacon*).

MEMMINGEN, a strong town of Suabia, near which, in 1795, the French republicans defeated the emigrants under the prince of Conde. It is seated in a fertile plain, 24 miles S.E. of Ulm, and 35 S.W. of Augsburg. Lon. 10. 16 E. Lat. 48. 3 N.

MEMMIUS, a Roman knight, who rendered himself illustrious for his eloquence and poetical talents. He was accused of extortion in his province, and banished by Julius Cæsar, though Cicero undertook his defence. Lucretius dedicated his poem to him.—2. A Roman who accused Jugurtha, before the Roman people. The Mummii were descended, according to some accounts, from Mnestheus, the friend of Æneas.

MEMNON, a king of Æthiopia, son of Tithonus and Aurora. He came with a body of 10,000 men to assist his uncle Priam during the Trojan war, where he behaved with great courage, and killed Antilochus, Nestor's son. The aged father challenged the Æthiopian monarch, but Memnon refused it on account of the venerable age of Nestor, and accepted that of Achilles. He was killed in the combat in the sight of the Grecian and Trojan armies. Memnon was the inventor of the alphabet, according to Anticlides, a writer mentioned by Pliny.—2. A general of the Persian forces, when Alexander invaded Asia. He distinguished himself for his attachment to the interest of Darius, his valour in the field, the soundness of his counsels, and his great sagacity. He defended Miletus against Alexander, and died in the midst of his successful enterprizes, B.C. 333.

MEMO'IR. *s.* (*memoire*, French.) 1. An account of transactions familiarly written (*Prior*). 2. Hint; notice; account of any thing (*Arbuthnot*).

ME'MORABLE. *a.* (*memorabilis*, Latin.) Worthy of memory; not to be forgotten (*Dry.*).

ME'MORABLY. *ad.* (from *memorable.*) In a manner worthy of memory.

MEMORA'NDUM. *s.* (Latin.) A note to help the memory (*Swift*).

MEMO'RIAL. *a.* (*memorialis*, Latin.) 1. Preservative of memory (*Broome*). 2. Contained in memory (*Watts*).

MEMO'RIAL. *s.* 1. A monument; something to preserve memory (*South*). 2. Hint to assist the memory (*Hayward*). 3. An address, reminding of services and soliciting reward.

MEMO'RIALIST. *s.* (from *memorial.*) One who writes memorials (*Spectator*).

*To* MEMORI'ZE. *v. a.* (from *memory.*) 1. To record; to commit to memory by writing (*Wot.*). 2. To cause to be remembered (*Shak.*).

ME'MORY. *s.* (*memoria*, Latin.) 1. The power of retaining or recollecting things past; retention; reminiscence; recollection (*Locke*). 2. Exemption from oblivion (*Shakspeare*). 3. Time of knowledge (*Milton*). 4. Memorial; monumental record (*Addison*). 5. Reflection; attention: not in use (*Shak.*).

When we remember with little or no effort, it is called remembrance simply, or memory, and sometimes passive memory. When we endeavour to remember what does not immediately and (as it were) of itself occur, it is called active memory, or recollection. A ready recollection of our knowledge, at the moment when we have occasion for it, is a talent of the greatest importance. The man possessed of it seldom fails to distinguish himself in whatever sort of business he may be engaged. It is indeed evident, that when the power of retention is weak, all attempts at eminence of knowledge must be vain; for "memory is the primary and fundamental power, without which there could be no other intellectual operation. Judgment and ratiocination suppose something already known, and draw their decisions only from experience. Imagination selects ideas from the treasures of remembrance, and produces novelty only by varied combinations. We do not even form conjectures of distant, or anticipations of future, events, but by concluding what is possible from what is past."

Memory, says Mr. Locke, is, as it were, the storehouse of our ideas: for the narrow mind of man not being capable of having many ideas under view at once, it was necessary to have a repository in which to lay up those ideas which it may afterwards require. But our ideas, being nothing but actual perceptions in the mind, which cease to be any thing when there is no perception of them; this laying up our ideas in the repository of the memory, signifies no more than this; that the mind has a power, in many cases, to revive perceptions it has once had, with this additional perception annexed to them, that it has had them before. And it is by the assistance of this faculty, that we are said to have all those ideas in our understandings which we can bring in sight, and make the objects of our thoughts, without the help of those sensible qualities which first imprinted them there.

Attention and repetition help much to the fixing ideas in our memories: but those which make the deepest and most lasting impressions are those which are accompanied with pleasure and pain. Ideas but once taken in and never again repeated, are soon lost; as those of colours in such as lost their sight when very young.

The memory of some men is tenacious almost to a miracle; but yet there seems to be a constant decay of all our ideas, even of those which are struck deepest; and in minds the most re-

tentive; so that if they be not sometimes renewed, the print wears out, and at last there remains nothing to be seen.

Those ideas that are often refreshed by a frequent return of the objects or actions that produce them, fix themselves best in the memory, and remain longest there: such are the original qualities of bodies, viz. solidity, extension, figure, motion, &c. and those that almost constantly affect us, as heat and cold.

In memory, the mind is oftentimes more than barely passive; for it often sets itself on work to search some hidden ideas; sometimes they start of their own accord; and sometimes tempestuous passions tumble them out of their cells. This faculty other animals seem to have to a great degree, as well as men, as appears by birds learning tunes, and their endeavour to strike the notes right. For it seems impossible that they should endeavour to conform their voices (as it is plain they do) to notes whereof they have no idea.

Of a faculty so important, many rules have been given for the regulation and improvement; of which the first is, that he who wishes to have a clear and distinct remembrance, should be temperate with respect to eating, drinking, and sleep. The memory depends very much upon the state of the brain; and therefore whatever is hurtful to the latter, must be prejudicial to the former. Too much sleep clouds the brain, and too little overheats it; therefore either of these extremes must of course hurt the memory, and ought carefully to be avoided. Intemperance of all kinds, and excess of passion, have the same ill effects; so that we rarely meet with an intemperate person whose memory is at once clear and tenacious.

Doubtless, the most effectual way to gain a good memory is by constant and moderate exercise of it; for the memory, like other habits, is strengthened and improved by daily use. It is indeed hardly credible to what a degree both active and passive remembrance may be improved by long practice. Scaliger reports of himself, that in his youth he could repeat above 100 verses, having once read them; and Berthicus declares, that he wrote his Comment upon Claudian without consulting the text. To hope, however, for such degrees of memory as these, would be equally vain as to hope for the strength of Hercules, or the swiftness of Achilles. "But there are clergymen who can get a sermon by heart in two hours, though their memory, when they began to exercise it, was rather weak than strong: and pleaders, with other orators who speak in public and extempore, often discover, in calling instantly to mind all the knowledge necessary on the present occasion, and every thing of importance that may have been advanced in the course of a long debate, such powers of retention and recollection as, to the man who has never been obliged to exert himself in the same manner, are altogether astonishing. As habits, in order to be strong, must be formed in early life, the memories of children should therefore be constantly exercised; but to oblige them to commit to memory what they do not understand, perverts their faculties, and gives them a dislike to learning." In a word, those who have most occasion for memory, as orators and public speakers, should not suffer it to lie idle, but constantly employ it in treasuring up and frequently reviving such things as may be of most importance to them; for, by these means, it will be more at their command, and they may place greater confidence in it upon any emergency.

"Men complain of nothing more frequently (says Beattie) than of deficient memory; and indeed every one finds, that, after all his efforts, many of the ideas which he desired to retain have slipped irretrievably away; that acquisitions of the mind are sometimes equally fugitive with the gifts of fortune; and that a short intermission of attention more certainly lessens knowledge than impairs an estate. To assist this weakness of our nature, many methods besides those which we have mentioned have been proposed; all of which may be justly suspected of being ineffectual: for no art of memory, however its effects may have been boasted or admired, has been ever adopted into general use; nor have those who possessed it appeared to excel others in readiness of recollection or multiplicity of attainments." The reader who is desirous to try the effect of those helps, may have recourse to a treatise entitled A new Method of artificial Memory; but the true method of memory is attention and exercise.

Simonides is said to have been the first who found out the art of memory. His method was by a choice of places and images, as a repository of ideas; such, for instance, as a large house divided into several apartments, rooms, closets, &c. All these, and their order, were to be rendered extremely familiar to the imagination and memory. Then, whatever was to be remembered, was by some symbolical representation or another, as an anchor for navigation, to be connected with some part of the house, or other artificial repository, in a regular manner. Cicero and Quintilian give us some account of this method, and speak of it with respect. Several moderns have attempted improvements of artificial memory. There was a collection of various treatises of this kind published at Leipsic; this and Bruxius's Simonides Redivivus, are commended by Morhof. Paschius gives us some account also of several authors who have treated of this art. It is certainly of use in history and chronology. The chief artifice, in this respect, is to form an artificial word, the letters of which shall signify numbers. Hence a date or æra may more easily be recapitulated and remembered than without such a contrivance. This invention is mentioned as a secret known to few, by Paschius. It has been prosecuted lately in England, by Dr. Grey.

The method is this: to remember any thing in history, chronology, geography, &c. a word is formed, the beginning whereof being the first syllable or syllables of the thing to be remembered, does, by frequent repetition, of course draw after it the latter parts, which is so con-

trived as to give the answer. Thus, in history, the deluge happened in the year before Christ 2348. This may be signified by the word Dél *étok*; Del standing for delúge, and *etok* for 2348. How these words come to signify these things, or contribute to the remembering them, is now to be shewn.

The first thing to be done, is to learn exactly the following series of vowels and consonants, which are to represent the numerical figures, so as to be able at pleasure to form a technical word, which shall stand for any number, or to resolve a word already formed into the number it stands for.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *a* | *e* | *i* | *o* | *u* | *au* | *oi* | *ei* | *ou* | *y* |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
| *b* | *d* | *t* | *f* | *l* | *s* | *p* | *k* | *n* | *z* |

Here *a* and *b* stand for 1, *e* and *d* for 2, *i* and *t* for 3, and so on. These letters are assigned arbitrarily to the respective figures, and may very easily be remembered. The first five vowels in order naturally represent 1, 2, 3, 4, 5. The diphthong *au*, being composed of *a*, 1, and *u*, 5, stands for 6; *oi* for 7, being composed of *o*, 4 and *i*, 3; *ou* for 9, being composed of *o*, 4, and *u*, 5: The diphthong *ei* will easily be remembered for 8, being the initials of the word. In like manner for the consonants, where the initials could be conveniently be retained, they are made use of to signify the number, as *t* for 3, *f* for 4, *s* for 6, and *n* for 9. The rest were assigned without any particular reason, unless that possibly *p* may be more easily remembered for 7, or *septem*, *k* for 8, or οκτω, *d* for 2, or *duo*; *b* for 1, as being the first consonant, and *l* for 5, being the Roman letter for 50, than any others that could have been put in their places. Mem. Techn. p. 2, 3. It is further to be observed, that *z* and *y* being made use of to represent the cypher, where many cyphers meet together, as 1000, 1000000, &c. instead of a repetition of *azyzyzy*, &c. let *g* stand for 100, *th* for a thousand, and *m* for a million. Thus *ag* will be 100, *ig* 300; *oug* 900, &c. *ath* 1000, *am* 1000000, *loum* 59000000, &c. Ib. p. 5. Fractions may be set down in the following manner: let *r* signify the line separating the numerator and denominator, the first coming *before*, the other *after* it; as *iro* $\frac{3}{4}$, *urp* $\frac{5}{7}$, *pourag* $\frac{71}{100}$, &c. When the numerator is 1 or unit, it need not be expressed, but begin the fraction with *r*; as *re* $\frac{1}{2}$, *ri* $\frac{1}{3}$, *ro* $\frac{1}{4}$, &c. So in decimals, *rag* $\frac{1}{100}$, *rath* $\frac{1}{1000}$. Ibid.

This is the principal part of the method, which consists in expressing numbers by artificial words. The application to history and chronology is also performed by artificial words. The art herein consists in making such a change in the ending of the name of a place, person, planet, coin, &c. without altering the beginning of it, as shall readily suggest the thing sought, at the same time that the beginning of the word, being preserved, shall be a leading or prompting syllable to the ending of it so changed. Thus in order to remember the years in which Cyrus, Alexander, and Julius Cæsar, founded their respective monarchies, the following word may be formed; for Cyrus, Cyr*uts*; for Alexander, Alex*ita*; for Julius Cæsar, Juli*os*. *Uts* signifies, according to the powers assigned to the letters before mentioned, 536; *ita* is 331, and *os* is 46. Hence it will be easy to remember, that the empire of Cyrus was founded 536 years before Christ, that of Alexander 331, and that of Julius Cæsar, 46. Mem. Techn. Introd. p. viii. and ix.

For the farther application of this method, we refer to the ingenious author of the last cited book. We shall only add, that technical verses contribute much to the assistance of the memory, both as they generally contain a great deal in a little compass, and also because, being once learned, they are seldom or never forgot. The author before quoted has given us several specimens of such verses in history, chronology, geography, and astronomy, as also the Jewish, Grecian and Roman coins, weights and measures, &c. He advises his reader to form the words and verses for his own use himself; as he perhaps will better remember them than those formed by the author.

Be this as it will, we shall here give his table of the kings of England since the conquest; where one thousand being added to the italics in each word, expresses the year when they began their reigns. Thus,

Will con*sau*, Ruf*koi*, Hen*rag*.
Steph*bil* & Hensec*buf*, Rich*bein*, J*ann*, Heth*das*, & Ed*doid*.
Edse*typ*, Edter*tes*, Rise*toip*, Hefo*toun*, Hefi*fad*que.
Hensi*fed*, Edquar*fauz*, Efi R*okt*, Hensep*feil*, Henoc*lyn*.
Edsex*los*, Mary*lut*, Els*luk*, Jam*syd*, Caroprim*sel*.
Carsec*sok*, Jam*seif*, Wil*seik*, An*pyb*, Geo*bo-doi-sy*.

As to Simonides' method, Quintilian says he will not deny it to be of some use; for instance, in repeating a multitude of words in the order they occur, and in things of this nature: but he thinks it of less use in getting by heart a continued oration, and in this respect rather an incumbrance. He himself advises, if the speech to be remembered be long, to get it by heart in parts, and those not very small. The partition ought chiefly to be made according to the different topics. He thinks it best to get things by heart tacitly, and if, the better to fix the attention, the words be pronounced, yet it should be in a low voice. Apt divisions help the memory greatly. But after all, the great art of memory is exercise; to get many things by heart, and daily, if possible. Nothing increases more by use, or suffers more by neglect, than the memory. At whatever age a man aims at the improvement of this faculty, he should patiently submit to the uneasy labour of repeating what he has read or written. Here, as in other cases, where habits are to be acquired, exercise should be increased by degrees. Quint. Inst. Orat. lib. xi. cap. 2. p. 989.

Lord Bacon enumerates several helps to memory, as order, artificial place, verse, whatever brings an intellectual thing to strike the senses, and those things which make an impression by

means of a strong passion, as fear, surprise, &c. Those things also sink deepest, and dwell longest in the memory, which are impressed upon a clear mind unprejudiced either before or after the impression, as the things we learn in childhood, or think of just before going to sleep; as likewise the first times things are taken notice of.

A multitude of circumstances also, or, as it were, handles or holds to be taken, help the memory; as the making many breaks in writing, reading or repeating aloud: but as to this last, see Quintilian's opinion before mentioned. Those things which are expected, and raise the attention, stick better than such as pass slightly over the mind; whence if a man reads any writing twenty times over, he will not remember it so well as if he read it but ten times with trying between whiles to repeat it, and consulting the copy where his memory failed.

MEMPHIS, a celebrated town of Egypt, on the western banks of the Nile, above the Delta, so called from a nymph, one of the daughters of the Nile. It once contained many beautiful temples, particularly those of the god Apis. (See Apis.) It was in the neighbourhood of Memphis that those famous pyramids were built, whose grandeur and beauty still astonish the modern traveller. The place where Memphis formerly stood is not now known; the ruins of its former grandeur were conveyed to Alexandria, to beautify its palaces, or to adorn the neighbouring cities.

MEN. The plural of *man*.

Men-pleaser. *s.* (*men* and *pleaser*.) One too careful to please others (*Ephesians*).

Men. (Ital.) The abbreviation of *Meno*, Less: as *Men allegro*, Less quick: *Men presto*, Less rapid.

*To* ME'NACE. *v. a.* (*menacer*, French.) To threaten; to threat (*Shakspeare*).

Me'nace. *s.* (*menace*, French.) Threat (*Brown*).

ME'NACER. *s.* (*menaceur*, French.) A threatener; one that threats (*Phillips*).

MENA'CHANITE, in mineralogy. See Titanium.

MENAGE (Fr.), denotes a collection of animals; whence we have derived the word *menagerie*, or *menagery*.

Menage (Giles), in Latin *Ægidius*, a celebrated French writer, born at Angers in 1613. He finished his studies in that city, was made advocate, and pleaded for some time at Angers, Paris, and Poictiers; but, becoming at length disgusted with the bar, turned ecclesiastic, and gave himself up entirely to the study of polite literature. He at length entered into the family of the cardinal de Ritz; but disagreeing with some persons belonging to his eminence, went to live in the cloister of Notre Dame, where he held an assembly of learned men every Wednesday. He read a great deal; had a prodigious memory; and was incessantly quoting in his conversation verses in Greek, Latin, Italian, French, &c. on which account he was often turned into ridicule by the wits, especially towards the end of his days. His great memory he retained even in his old age: and, what is very rare, it returned to him after some interruption. The reputation of his works procured him a place in the academy della Crusca at Florence. He might have been a member of the French academy at its first institution, if it had not been for his Requeste des Dictionnaires: but when that was forgot, he was proposed in 1684 to fill up a vacant place in that academy, and was excluded only by the superior interest of his competitor Mr. Bergent; for there was not one member of all those who gave their votes against him but owned that he deserved the place. He would not suffer his friends to propose him again. He died at Paris in 1692, aged 79. He wrote a great number of books in prose and verse; the principal of which are, 1. Miscellaneous works. 2. The Origin of the French Language. 3. The Origin of the Italian Tongue; the best edition of which is that of Geneva, in 1685, folio. 4. An edition of Malherbe's Poems, with Notes. 5. An edition of Diogenes Laertius, with Observations. 6. Remarks on the French Tongue. 7. Greek, Latin, Italian, and French Poems.

MENAGOGUES. See Emmenagogues.

MENALIPPE, a sister of Antilope, queen of the Amazons, taken by Hercules when that hero made war against this celebrated nation. She was ransomed, and Hercules received in exchange the arms and belt of the queen. (*Juv.*)—A daughter of the centaur Chiron, beloved and ravished by Æolus, son of Helen. She retired into the woods to hide her disgrace, and when she had brought forth, she entreated the gods to remove her totally from the pursuits of Chiron. She was changed into a mare, and called Osyroe. She became a constellation after death, called the horse. (*Hygin.*)—Menalippe is a name common to other persons, but it is generally spelt Melanippe, by the best authors. (See Melanippe.)

MENANDER, a celebrated comic poet, of Athens, educated under Theophrastus. He was universally esteemed by the Greeks, and received the appellation of Prince of the New Comedy. His writings were replete with elegance, refined wit, and judicious observations. Of 108 comedies which he wrote, nothing remains but a few fragments. It is said that Menander drowned himself in the 52d year of his age, B. C. 293, because the compositions of his rival Philemon obtained more applause than his own.—There were many others of this name, but of inferior note. The fragments of Menander were first published by Morel in Greek, at Paris, A.D. 1553. The edition of Leclerc, published at Amsterdam, in 1709 and 1712, is full of blunders, which were severely criticised by Dr. Bentley.

MENCKE (Otto), a learned German, was born at Oldenburg in Westphalia in 1644. He became professor of morality at Leipsic, and rector of that university. He died in 1707. His most considerable work was the Acta Eruditorum of Leipsic, the first volume of which was entirely by him.

Mencke (John Burcard), son of the preceding, was born at Leipsic in 1674. In 1699

he was made professor of history, and gained great reputation by his lectures. He died in 1732. His works are numerous, the chief of which is entitled De Charlataneria eruditorum declamationes duæ, 1715, 8vo. He continued the Acta Eruditorum, which had been begun by his father.

*To* MEND. *v. a.* (*emendo*, Latin.) To repair from breach or decay (*Chron.*). 2. To correct; to alter for the better (*Pope*). 3. To help; to advance (*Locke*). 4. To improve; to increase (*Dryden*).

*To* Mend. *v. n.* To grow better; to advance in any good (*Pope*).

ME'NDABLE. *a.* (from *mend.*) Capable of being mended.

MENDA'CITY. *s.* (from *mendax*, Latin.) Falsehood (*Brown*).

MENDE, an ancient town of France, capital of the department of Lozere, with a bishop's see. The fountains, and one of the steeples of the cathedral, are remarkable. It is very populous; has manufactures of serges and other woollen stuffs; and is seated on the Lot, 35 miles S.W. of Puy, and 210 S. by E. of Paris. Lon. 3. 35 E. Lat. 44. 31 N.

ME'NDER. *s.* (from *mend.*) One that makes any change for the better (*Shakspeare*).

MEN'DICANT. *a.* (*mendicans*, Lat.) Begging; poor to a state of beggary (*Fiddes*).

Me'ndicant. *s.* (*mendicant*, French.) A beggar; one of some begging fraternity.

Mendicants, or begging friars, several orders of religious in popish countries, who, having no settled revenues, are supported by the charitable contributions they receive from others. This sort of society began in the 13th century; and the members of it, by the tenor of their institution, were to remain entirely destitute of all fixed revenues and possessions; though in prosess of time their number became a very heavy tax upon the people. Innocent III. was the first of the popes who perceived the necessity of instituting such an order; and accordingly he gave such monastic societies, as made a profession of poverty, the most distinguishing marks of his protection and favour. They were also encouraged and patronized by the succeeding pontiffs, when experience had demonstrated their public and extensive usefulness. But when it became generally known that they had such a peculiar place in the esteem and protection of the rulers of the church, their number grew to such an enormous and unwieldy multitude, and swarmed so prodigiously in all the European provinces, that they became a burthen, not only to the people, but to the church itself. The great inconvenience that arose from the excessive multiplication of the mendicant orders was remedied by Gregory X. in a general council, which he assembled at Lyons in 1272. For here all the religious orders that had sprung up after the council held at Rome in 1215, under the pontificate of Innocent III. were suppressed; and the extravagant multitude of mendicants, as Gregory called them, were reduced to a smaller number, and confined to the four following societies or denominations, viz. the Dominicans, the Franciscans, the Carmelites, and the Augustins or hermits of St. Augustin.

As the pontiffs allowed these four mendicant orders the liberty of travelling wherever they thought proper, of conversing with persons of every rank, of instructing the youth and multitude wherever they went; and as those monks exhibited, in their outward appearance and manner of life, more striking marks of gravity and holiness than were observable in the other monastic societies, they arose all at once to the very summit of fame, and were regarded with the utmost esteem and veneration through all the countries of Europe. The enthusiastic attachment to these sanctimonious beggars went so far, that, as we learn from the most authentic records, several cities were divided or cantoned out into four parts, with a view to these four orders; the first part being assigned to the Dominicans, the second to the Franciscans, the third to the Carmelites, and the fourth to the Augustinians. The people were unwilling to receive the sacrament from any other hands than those of the mendicants, to whose churches they crowded to perform their devotions, while living, and were extremely desirous to deposit there also their remains after death.

*To* ME'NDICATE. *v. a.* (*mendico*, Latin; *mendier*, French.) To beg; to ask alms.

MENDI'CITY. *s.* (*mendicitas*, Lat.) The life of a beggar.

MENDIP-HILLS, a lofty tract, in the N.E. of Somersetshire, abounding in coal, calamine, and lead; the latter said to be of a harder quality than that of other countries. Copper, manganese, bole, and red ochre, are also found in these hills. On their summits are large swampy flats, dangerous to cross.

MENDLESHAM, a town in Suffolk, with a market on Friday, 18 miles E. of Bury St. Edmunds, and 82 N.E. of London. Lon. 1. 12 E. Lat. 52. 24 N.

MENDRAH, a province of the kingdom of Fezzan, much of which is a continued level of hard and barren soil; but the quantity of trona, a species of fossil alkali, that floats on the surface, or settles on the banks of its numerous smoking lakes, has given it a higher importance than that of the most fertile districts. It has a town of the same name, 60 miles S. of Mourzook.

MENDRISIO, a town of Swisserland, the capital of an Italian bailiwic, containing about 16,000 inhabitants. It is seven miles W. of Como. Lon. 8. 59 E. Lat. 25. 45 N.

MENDS, for *amends* (*Shakspeare*).

MENECRATES. The most remarkable of this name is a physician of Syracuse, famous for his vanity and arrogance. He crowned himself like the master of the gods, and in a letter which he wrote to Philip king of Macedon, he styled himself in these words, *Menecrates Jupiter to king Philip, greeting.* The Macedonian monarch answered, *Philip to Menecrates, greeting, and better sense.* Philip invited him to one of his feasts, but a table was put separate for the physician, on which

he was served only with perfumes and frankincense, like the father of the gods. He then remembered that he was a mortal. He lived about 360 years before the Christian æra.

MENEDEMUS, a Greek philosopher of the Cyrenaic sect, born in the island of Eubœa. He was held in high esteem among his countrymen for some time, but at length some persons, out of envy, prejudiced their minds against him on the false charge of his having formed the design of betraying the state. He died in the reign of Alexander the Great.

MENEDEMUS, a cynic philosopher, who lived at a later period than the preceding. He wore a long black gown, a scarlet girdle, a cap on his head whereon were represented the signs of the zodiac. In this fantastic dress he used to perambulate, pretending that he was commissioned by the infernal deities. Menippus was the disciple of this madman.

MENEHOULD (St.), an ancient and considerable town of France, in the department of Marne, with a castle advantageously situate; but its other fortifications have been demolished. It was almost totally destroyed by a conflagration in 1719. It was here, in 1792, that the French gave the first check to the progress of the victorious Prussians, which in the end compelled them to a retreat. St. Menehould is seated in a morass, on the river Aisne, between two rocks, 20 miles N.E. of Chalons, and 110 E. of Paris. Lon. 4. 59 E. Lat. 49. 2 N.

MENELAUS, a king of Sparta, brother to Agamemnon. His father's name was Atreus, according to Homer, or according to Hesiod, &c. he was the son of Plisthenes and Ærope. (See PLISTHENES.) He was educated with his brother Agamemnon in the house of Atreus, but soon after his death, Thyestes his brother usurped the kingdom, and banished the two children of Plisthenes. Menelaus and Agamemnon came to the court of Œneus, king of Calydonia, who treated them with paternal care. From Calydonia they went to Sparta, where, like the rest of the Grecian princes, they solicited the marriage of Helen, the daughter of king Tyndarus, who made choice of Menelaus. (See HELENA.) As soon as the nuptials were celebrated, Tyndarus resigned the crown to his son-in-law, and their happiness was complete. This was, however, of short duration, and the arrival of Paris in Sparta was the cause of great revolutions. (See PARIS.) Paris carried off Helen, and the Greek princes, mindful of their oath, took up arms to defend the cause of Menelaus. The combined forces assembled at Aulis in Bœotia, where they chose Agamemnon for their general, and Calchas for their high priest. They then marched to meet their enemies in the field. During the Trojan war, Menelaus behaved with great spirit and courage, and Paris must have fallen by his hand, had not Venus interposed, and redeemed him from certain death. In the tenth year of the Trojan war, Helen, by perfidiously introducing Menelaus into the chamber of Deiphobus, obtained his forgiveness, and she returned with him to Sparta, after a voyage of eight years. He died some time after his return.

MENES, the first king of Egypt. He built the town of Memphis, as it is generally supposed, and deserved, by his abilities and popularity, to be called a god after death.

MENESTEUS or MENESTHEUS, or MNESTHEUS, a son of Pereus, who so insinuated himself into the favour of the people of Athens, that during the long absence of Theseus, he was elected king. The lawful monarch, at his return home, was expelled, and Mnestheus established his usurpation by his popularity and great moderation. As he had been one of Helen's suitors, he went to the Trojan war at the head of the people of Athens, and died in his return in the island of Melos. He reigned 23 years, 1205 B. C. and was succeeded by Demophoon, the son of Theseus.

MENESTRAUDIE, or MINSTRELSY. (French.) The general name under which the successors of Philip-Augustus of France recalled and established those minstrels of Paris who had formed themselves into a company, but whom, on account of their irregularity and licentiousness of conduct, that prince had banished from the kingdom in the first year of his reign. The Menestraudie had a chief appointed over them called the King of the Minstrels.

MENGEN, a town of Germany, in Austrian Suabia, 33 miles SW. of Ulm, and 45 S. of Stutgard. Lon. 9. 13 E. Lat. 48. 1 N.

MENGS (Anthony Raphael), first painter to the king of Spain, was born at Aussig in Bohemia, A. D. 1728. His father, painter to Augustus III. king of Poland, perceiving his superior talents, carried him from Dresden to Rome in 1741. After having there pursued his art for four years, and copied the principal monuments of that capital, he returned to Dresden, where he executed different works for Augustus with very uncommon success. During his abode in Italy he became acquainted with Don Carlos king of Naples; and when this prince succeeded to the crown of Spain in 1761, he was careful to engage Mengs in his service, by granting him a yearly pension of 2000 doubloons, together with a house and equipage. He lived, however, chiefly at Rome; where, in 1779, he fell a sacrifice to his confidence in a German quack, who pretended to cure him of a disease which he had contracted partly by his intense application, and partly by grief for the loss of his wife. Mengs was an author as well as a painter, and his works, which chiefly relate to the fine arts, have been published in 2 vols. 4to. by the chevalier d'Azara. He combined the peculiar excellencies of Raphael, Correggio, and Titian.

ME'NIAL. *a.* (from *meiny.*) Belong to the retinue, or train of servants (*Dryden*).

ME'NIAL. *s.* One of the train of servants.

ME'NIAS. In botany, a genus of the class pentandria, order monogynia. Corol salver-shaped; calyx three-leaved; berry four-

celled; seeds solitary. One species: a South American herb, with alternate, ovate, entire, rough leaves.

MENIE. See MUNIA.

MENIN, a town of Austrian Flanders, seated on the Lis. In 1585, it was almost entirely destroyed by fire. It is considered as the key of the country; and in every war, from the middle of the 17th century, the possession of it has been deemed of the utmost consequence. It has therefore been often taken and retaken; the last time by the French in 1794, when the garrison (in order to save the unhappy emigrants) bravely forced their way through the enemy. It is eight miles SE. of Ypres, and 10 N. of Lisle. Lon. 3. 9 E. Lat. 50. 48 N.

MENINSKI or MENIN (Franciscus a Mesgnien), a learned orientalist, was born in Lorraine in 1623. He travelled to the East, and for his skill in the oriental languages was made counsellor of war to the emperor, and principal interpreter. He died at Vienna in 1698. His greatest work is entitled, Thesaurus Linguarum Orientalium, Vienna, 5 vols. folio, 1680, and 1687.

MENINX. (*meninx*, μηνιγξ, from μενω, to remain.) The Greek term for the membranes enveloping the brain. See DURA MATER and PIA MATER.

MENINX DURA. See DURA MATER.

MENIPPUS, a cynic philosopher, and the disciple of Menedemus, was born at Gadara in Palestine. He wrote some snarlish satires, for which reason writings of that stamp have been sometimes called Menippean.

MENI'SCIUM. In botany, a genus of the class cryptogamia, order filices. Fructification in nearly parallel lunules, with the veins of the frond intervening; involucreless. Two species; both exotics.

MENISCUS, a lens or glass, convex on one side, and concave on the other. Sometimes also called a lune or lunula. See DIOPTRICS.

To find the focus of a meniscus, the rule is, as the difference between the diameters of the convexity and concavity, is to either of them, so is the other diameter to the focal length, or distance of the focus from the meniscus. So that, having given the diameter of the convexity, it is easy to find that of the concavity, so as to remove the focus to any proposed distance from the meniscus. For, if D and $d$ be the diameters of the two sides, and $f$ the focal distance; then since,

by the rule $D-d : D :: d : f$,
therefore $d : D :: f-d : f$,
or $f-d : f :: d : D$.

Hence, if D the diameter of the concavity be double to $d$ that of the convexity, $f$ will be equal to D, or the focal distance equal to the diameter; and therefore the meniscus will be equivalent to a plano-convex lens.

Again, if $D=3d$, or the diameter of the concavity triple to that of the convexity, then will $f=\frac{1}{2}D$, or the focal distance equal to the radius of concavity; and therefore the meniscus will be equivalent to a lens equally convex on either side.

But if $D=5d$, then will $f=\frac{1}{4}D$; and therefore the meniscus will be equivalent to a sphere.

Lastly, if $D=d$, then will $f$ be infinite; and therefore a ray falling parallel to the axis, will still continue parallel to it after refraction.

MENISPE'RMUM. Moon-seed. In botany, a genus of the class diœcia; order dodecandria. Petals four, exterior; eight interior. Male: stamens sixteen. Fem.: stamens eight, barren; berries two, one-seeded. Twelve species, natives of India chiefly; three of America. Of these the chief is M. cocculus—with cordate, retuse, mucronate leaves, and jagged stem. The berries are the common cocculus indicus of the shops, and are extremely intoxicating.

MENNONITES, a sect of Baptists, who were formerly prevalent in Holland; taking their rise in 1536, from one Menno Simon, a Romish priest.

MENŒCEUS, a young Theban, son of Creon. He offered himself to death for the Di Manes, when an oracle had ordered the Thebans to sacrifice one of the descendants of those who sprang from the dragon's teeth, and he killed himself near the cave where the dragon of Mars had formerly resided.

MENŒTES, the pilot of the ship of Gyas, at the naval games exhibited by Æneas at the anniversary of his father's death. He was thrown into the sea by Gyas for his inattention, and saved himself by swimming to a rock.

MENŒTIUS, a son of Actor and Ægina. He left his mother and went to Opus, where he had by Sthenele, Patroclus, often called from him Menœtiades. Menœtius was one of the Argonauts.

MENO'LOGY. *s.* (μενολόγιον.) A register of months (*Stillingfleet*).

MENORRHA'GIA. (*menorrhagia*, μενορραγια, from μηνια, the menses, and ῥηγνυμι, to break out.) An immoderate flow of the menses. A genus of disease in the class pyrexia and order hæmorrhagia of Cullen. Species, 1. Menorrhagia rubra, proper; from women neither with child nor in childbirth. 2. Menorrhagia alba, serous; the fluor albus; see LEUCORRHŒA. 3. Menorrhagia vitiorum, from some local disease. 4. Menorrhagia lochialis, from women after delivery. See LOCHIA.

ME'NOW. *s.* (commonly *minnow*.) A fish.

ME'NSAL. *a.* (*mensalis*, Latin.) Belonging to the table; transacted at table (*Clarissa*).

MENSES. See CATAMENIA and MENSTRUATION.

ME'NSTRUAL. *a.* (*menstruus*, Latin.) 1. Monthly; happening once a month; lasting a month (*Bentley*.) 2. Pertaining to a menstruum (*Bacon*).

MENSTRUATION. From the uterus of every healthy woman who is not pregnant, or who does not give suck, there is a discharge of a fluid resembling blood, at certain periods, from the time of puberty to the approach of

old age; and, from the periods or returns of this discharge, it is called menstruation. There are several exceptions to this definition. It is said that some women never menstruate; some menstruate while they continue to give suck; and others are said to menstruate during pregnancy: some are said to menstruate in early infancy, and others in old age; but such discharges, Dr. Denman is of opinion may, with more propriety, be called morbid, or symptomatic: but the definition is generally true.

At whatever time of life this discharge comes on, a woman is said to be at puberty: though of this it is a consequence, and not a cause. The early or late appearance of the menses may depend upon the climate, the constitution, the delicacy or hardness of living, and upon the manners of those with whom young women converse. In Greece and other hot countries girls begin to menstruate at eight, nine, and ten years of age; but, advancing to the northern climes, there is a gradual protraction of the time till we come to Lapland, where women do not menstruate till they arrive at maturer age, and then in small quantities, at long intervals, and sometimes only in the summer. But, if they do not menstruate according to the genius of the country, it is said they suffer equal inconveniences as in warmer climates, where the quantity discharged is much greater, and the periods shorter. In this country, girls begin to menstruate from the fourteenth to the eighteenth year of their age, and sometimes at a later period, without any signs of the disease; but if they are luxuriously educated, sleeping upon down beds, and sitting in hot rooms, menstruation usually commences at a more early period.

Many changes in the constitution and appearance of women are produced at the time of their first beginning to menstruate. Their complexion is improved, their countenance is more expressive and animated, their attitudes graceful, and their conversation more intelligent and agreeable; the tone of their voice becomes more harmonious, their whole frame, but particularly their breasts, are expanded and enlarged, and their minds are no longer engaged in childish pursuits and amusements.

Some girls begin to menstruate without any preceding indisposition; but there are generally appearances or symptoms which indicate the change that is about to take place. These are usually more severe at the first than in the succeeding periods: and they are similar to those produced by uterine irritation from other causes, as pains in the back and inferior extremities, complaints of the viscera, with various hysteric and nervous affections. These commence with the first disposition to menstruate, and continue till the discharge comes on, when they abate or disappear, returning, however, with considerable violence in some women, at every period during life. The quantity of blood discharged at each evacuation depends upon the climate, constitution, and manner of living; but it varies in different women in the same climate, or in the same woman at different periods; in this country it amounts to about five or six ounces.

There is also a great difference in the time required for the completion of each period of menstruation. In some women the discharge returns precisely to a day or an hour, and in others there is a variation of several days without inconvenience. In some it is finished in a few hours, and in others it continues from one to ten days, but the intermediate time, from three to six days, is the most usual.

There has been an opinion, probably derived from the Jewish legislator, afterwards adopted by the Arabian physicians, and credited in other countries, that the menstruous blood possessed some peculiar malignant properties. The severe regulations which have been made in some countries for the conduct of women at the time of menstruation, the expression used, Isaiah, chap. xxx. and Ezekiel, the disposal of the blood discharged, or of any thing contaminated with it, the complaints of women attributed to its retention, and the effects enumerated by grave writers, indicate the most dreadful apprehensions of its baneful influence. Under peculiar circumstances of health, or states of the uterus, or in hot climates, if the evacuation be slowly made, the menstruous blood may become more acrimonious or offensive than the common mass, or any other secretion from it: but in this country and age, no malignity is suspected, the menstruous woman mixes in society as at all other times, and there is no reason for thinking otherwise than that this discharge is of the most inoffensive nature.

At the approach of old age women cease to menstruate; but the time of cessation is commonly regulated by the original early or late appearances of the menses. With those who began to menstruate at ten or twelve years of age, the discharge will often cease before they arrive at forty; but if the first appearance was protracted to sixteen or eighteen years of age, independently of disease, such women may continue to menstruate till they have passed the fiftieth, or even approach the sixtieth year of their age. But the most frequent time of the cessation of the menses, in this country, is between the forty-fourth and forty-eighth year; after which women never bear children. By this constitutional regulation of the menses, the propagation of the species is in every country confined to the most vigorous part of life: and had it been otherwise, children might have become parents, and old women might have had children, when they were unable to supply them with proper or sufficient nourishment. See CATAMENIA and MIDWIFERY.

MENSTRUOUS. *a.* (*menstruus*, Latin.) 1. Having the catamenia (*Sandys*). 2. Happening to women at certain times (*Brown*).

MENSTRUUM. (*menstruum.*) Solvent. All liquors are so called, which are used as dissolvents, or to extract the virtues or ingredients by infusion, decoction, &c. The principal menstrua made use of in pharmacy are water,

vinous spirits, oils, acid, and alkaline liquors. Water is the menstruum of all salts, of vegetable gums, and of animal jellies. Of the first it dissolves only a determinate quantity, though of one kind of salt more than of another; and being thus saturated, leaves any additional quantity of the same salt untouched. It is never saturated with the two latter, but unites readily with any proportion of them, forming with different quantities, liquors of different consistencies. It takes up likewise, when assisted by trituration, the vegetable gummy resins, as ammoniacum and myrrh; the solutions of which, though imperfect, that is, not transparent, but turbid and of a milky hue, are nevertheless applicable to valuable purposes in medicine. Rectified spirit of wine is the menstruum of the essential oils and resins of vegetables; of the pure distilled oils of animals; and of soaps, though it does not act upon the expressed oil and fixed alkaline salts, of which soap is composed. Hence, if soap contain any superfluous quantity of either the oil or salt, it may, by means of this menstruum, be excellently purified therefrom. It dissolves, by the assistance of heat, volatile alkaline salts; and more readily the neutral ones, composed either of fixed alkali and the acetous acid, as the sal diureticus, or of volatile alkali and the nitrous acid. Oils dissolve vegetable resins and balsams, wax, animal fats, mineral bitumens, sulphur, and certain metallic substances, particularly lead. The expressed oils are, for the most of these bodies, more powerful menstrua than those obtained by distillation; as the former are more capable of sustaining without injury a strong heat, which is in most cases necessary to enable them to act. All acids dissolve alkaline salts, alkaline earths, and metallic substances. The different acids differ greatly in their action, upon these last: one dissolving some particular metals; and another, others. The vegetable acids dissolve a considerable quantity of zinc, iron, copper, and tin; and extract so much from the metallic part of antimony as to become powerfully emetic: they likewise dissolve lead, if previously calcined by fire; but more copiously if corroded by their steam. The marine acid dissolves zinc, iron, and copper; and though it scarce acts on any other metallic substance in the common way of making solutions, may, nevertheless, be artfully combined with them all except gold. The corrosive sublimate and antimonial caustic of the shops are combinations of it with mercury and the metallic part of antimony, effected by applying the acid in the form of fume, to the subjects at the same time strongly heated. The nitrous acid is the common menstruum of all metallic substances, except gold and the antimonial semi-metal, which are soluble only in a mixture of the nitrous and marine. The vitriolic acid easily dissolves zinc, iron, and copper; and may be made to corrode, or imperfectly dissolve most of the other metals. Alkaline lixivia dissolve oils, resinous substances, and sulphur. Their power is greatly promoted by the addition of quick-lime, instances of which occur in the preparation of soap and in the common caustic. Thus assisted, they reduce the flesh, bones, and other solid parts of animals, into a gelatinous matter. Solutions made in water and spirit of wine possess the virtue of the body dissolved; whilst oils generally sheathe its activity, and acids and alkalies vary its quality. Hence watery and spiritous liquors are the proper menstrua of the native virtues of vegetable and animal matters. Most of the foregoing solutions are easily effected, by pouring the menstruum on the body to be dissolved, and suffering them to stand together for some time, exposed to a suitable warmth. A strong heat is generally requisite to enable oils and alkaline liquors to perform their office; nor will acids act on some metallic bodies without its assistance. The action of watery and spirituous menstrua is likewise expedited by a moderate heat, though the quantity which they afterwards keep dissolved is not, as some suppose, by this means increased. All that heat occasions these to take up more than they would do in a longer time in the cold will, when the heat ceases, subside again. The action of acids on the bodies which they dissolve is generally accompanied with heat, effervescence, and a copious discharge of fumes. The fumes which arise during the dissolution of some metals in the vitriolic acid prove inflammable: hence in the preparation of the artificial vitriols of iron and zinc, the operator ought to be careful, especially where the solution is made in a narrow-mouthed vessel, lest, by the imprudent approach of a candle, the exhaling vapour be set on fire. There is another species of solution in which the moisture of air is the menstruum. Fixed alkaline salts and those of the neutral kind, composed of alkaline salts and the vegetable acids, or of alkaline earths, and any acid except the vitriolic, and some metallic salts on being exposed for some time to a moist air, gradually attract its humidity, and at length become liquid. Some substances, not dissoluble by water in its grosser form, as the butter of antimony, are easily liquified by this slow action of the aereal moisture. This process is termed *deliquation*. The cause of solution assigned by some naturalists, namely, the admission of the fine particles of one body into the pores of another, whose figure fits them for their reception, is not just or adequate, but hypothetical and ill-presumed; since it is found that some bodies will dissolve their own quantity of others, as water does of Epsom salt, alkohol of essential oils, mercury of metals, one metal of another, &c. whereas the sum of the pores or vacuities of every body must be necessarily less than the body itself, and consequently those pores cannot receive a quantity of matter equal to the body wherein they reside.

How a menstruum can suspend bodies much heavier than itself, which very often happens, may be conceived by considering, that the parts of no fluids can be so easily separated, but that they will a little resist or retard the

descent of any heavy bodies through them: and that this resistance is, *cæteris paribus*, still proportionable to the surface of the descending bodies. But the surface of bodies by no means increase or decrease in the same proportion as their solidities do: for the solidity increases as the cube, but the surface only as the square of the diameter; wherefore it is plain, that very small bodies will have much larger surfaces, in proportion to their solid contents, than larger bodies will, and consequently, when become exceeding small, may easily be buoyed up in the liquor.

MENSURABI'LITY. *s.* (*mensurabilité*, French.) Capacity of being measured.

ME'NSURABLE. *a.* (*mensura*, Lat.) Measurable; that may be measured (*Holder*).

ME'NSURAL. *a.* (from *mensura*, Latin.) Relating to measure.

*To* ME'NSURATE. *v. a.* (from *mensura*, Latin.) To measure; to take the dimension of any thing.

MENSURATION, the act, or art, of measuring figured extension and bodies; or of finding the dimensions, and contents of bodies, both superficial and solid.

Every different species of mensuration is estimated and measured by others of the same kind; so, the solid contents of bodies are measured by cubes, as cubic inches, or cubic feet, &c.; surfaces by squares, as square inches, feet, &c.; and lengths or distances by other lines, as inches, feet, &c.

The contents of rectilinear figures, whether plane or solid, can be accurately determined, or expressed; but of many curved ones, not. So the quadrature of the circle, and cubature of the sphere, are problems that have never yet been accurately solved. See the various kinds of mensuration, as well as that of the different figures, under their respective terms.

The first writers on Geometry were chiefly writers on Mensuration; as Euclid, Archimedes, &c. The best modern authors on Mensuration are Mr. Robertson, and Dr. Hutton. The work of the last mentioned author cannot be too warmly recommended; being very comprehensive, and peculiarly valuable both as it relates to the theory and practice.

MENTA'GRA. (*mentagra*, from *mentum*, the chin, and *αγρα*, a prey.) An eruption about the chin, forming a tenacious crust, like that on scald heads.

ME'NTAL. *a.* (*mentale*, French; *mentis*, Latin.) Intellectual; existing in the mind (*Milton*).

ME'NTALLY. *ad.* Intellectually; in the mind; not practically or externally, but in thought or meditation (*Bentley*).

MENTASTRUM. (*mentastrum*, of *mentha*, mint.) The red water mint. See MENTHA AQUATICA.

MENTHA. Mint. In botany, a genus of the class didynamia, order gymnospermia. Calyx five-cleft; corol nearly equal, four-cleft; the broadest segment notched; stamens erect, distant. Twenty species; almost all natives of Europe; two or three of India, and one of America; twelve common to the wastes, wet fields, ditches, and river banks of England. The following are the chief:

1. M. viridis. Spear-mint. Spikes interrupted, leaves sessile, lanceolate, acute, naked; bractes setaceous, a little hairy; teeth of the calyx somewhat hairy. It is common to our own marshes, and is an article in the London Pharmacopœia of the Royal College, under the name of mentha sativa. It is less warm than pepper-mint, but of more pleasant flavour, and hence more generally used for culinary purposes. It is a good stomachic, antispasmodic, and carminative; highly useful in anomalous retchings and other dyspeptic symptoms, often producing instantaneous relief. Its officinal preparations are an essential oil, a spirit, and a simple water.

2. M. piperita. Pepper-mint. Spikes obtuse, interrupted below; leaves petioled, somewhat ovate, nearly glabrous; calyx quite glabrous at the base. Found wild in our wet fields. The mentha piperitis of the London college, possesses a more pungent taste than spear-mint: is medically appropriated to the same uses; and officinally yields an essential oil, spirit, and simple water.

3. M. pulegium. Penny-royal. Flowers in whorls; leaves ovate; stem prostrate; pedicels and calyxes every where downy; teeth of the latter ciliate. Found on our wet heaths; and employed medicinally like the two preceding under the name of PULEGIUM, which see.

4. M. cervina. Hart's penny-royal. Flowers in whorls; bractes palmate; leaves linear; stamens longer than the corol. A native of Montpellier: employed medicinally under the name of PULEGIUM CERVINUM, which see. These are all easily propagated by cuttings, or dividing the roots.

MENTI'GO. (from *mentum*, the chin.) The scab among sheep, so called because it infests their mouths and chins.

ME'NTION. *s.* (*mention*, French; *mentio*, Latin.) 1. Oral or written recital of any thing (*Rogers*). 2. Cursory or incidental nomination (*Milton*).

*To* ME'NTION. *v. a.* (*mentionner*, French.) To write or express in words or writing (*Isa.*).

MENTON, a city of Italy, in the principality of Monaco, with a castle. It has a considerable trade in fruit and oil; and is seated near the sea, five miles E.N.E. of Monaco, and eight W.S.W. of Ventimiglia. Lon. 7. 35 E. Lat. 43. 46 N.

MENTOR, in fabulous history, a faithful friend of Ulysses.—An excellent artist in polishing cups, and engraving flowers on them.

MENTZ, an archbishopric and electorate of Germany, in the circle of Lower Rhine; bounded on the N. by Weteravia and Hesse, on the E. by Franconia, on S. by the palatinate of the Rhine, and on the W. by the electorate of Treves. It is 50 miles long and 20 broad, and very fertile. The elector is also sovereign

of Eichsfeld, Eisfeld, or Eifeld (a country surrounded by Hesse, Thuringia, Grubenhagen, and Calenberg), and of the city and territory of Erfort, in Thuringia.

MENTZ, or MAYENCE, a considerable city of Germany, capital of the electorate of Mentz, with a university, and an archbishop's see. The archbishop is an elector of the empire, arch-chancellor of the empire, keeper of the archives, and director of the general and particular assemblies. This city is built in an irregular manner, and plentifully provided with churches. In the cathedral, which is a gloomy fabric, is what they call a treasury, which contains a number of clumsy jewels, some relics, and a rich wardrobe of sacerdotal vestments. Mentz is one of the towns which claim the invention of printing; and the growth of the best rhenish wine is limited to a circle of about five miles round it. The French took this place by surprise, in October 1792; and they so greatly strengthened the fortifications, that, the next year, it stood a long blockade and siege against the king of Prussia, to whom, however, it surrendered in July 1793. It was re-attacked by the French in 1795, but they were defeated before it, both in April and October, by the Austrians, who also relieved it from a blockade of two months, in September 1796. They soon after, however, resumed the siege, which continued till the signing of the treaty of Udina, in October 1797, after which the emperor withdrawing the Austrian troops, and leaving the defence of it to the troops of the empire, it surrendered to the French, who still retain possession of it. Mentz is seated on the Rhine, just below its confluence with the Maine; and opposite to it, on the E. side, is the strong town of Cassel, connected with it by a bridge of boats. It is 15 miles W. of Francfort, and 75 E. of Treves. Lon. 8. 10 E. Lat. 49. 56 N.

MENTZEL (Christian), born at Furstenwall in the Mittlemark, celebrated for his skill in medicine and botany, in pursuit of which he travelled through many countries. He had correspondents in the most distant parts of the world. He died A. D. 1701, about the 79th year of his age. He was a member of the academy des Curieux de la Nature. His works are, 1. Index nominum plantarum, printed at Berlin in folio, 1696; and reprinted with additions in 1725, under the title of Lexicon plantarum polyglotton universale. 2. A Chronology of China, in German, printed at Berlin 1696, in 4to. The following manuscripts of his composition are preserved in the royal library at Berlin. 1. Sur l'histoire naturelle du Brasil, in four volumes, folio. 2. Sur les fleurs et les plantes du Japon, with coloured plates, two vols. folio.

MENTZELIA. In botany, a genus of the class polyandria, order monogynia. Calyx five-leaved; petals five; capsule inferior, cylindric, many-seeded. Two species; American plants, with slender stalks covered with short prickles unarmed; leaves ovate, very entire, rather acute, downy underneath; germs glabrous; berries two or three seeded. A native of Siberia, with small, roundish, bright red fruit.

4. M. oxyacantha. White-thorn. Hawthorn. May. Glastonbury-thorn. Spinous; leaves obtuse, mostly trifid, serrate, glabrous; segments of the calyx lanceolate, acute; styles three. There is another variety, with large kidney-form stipules. Found wild in our own hedges.

5. M. pyracantha. Evergreen-thorn. Spinous; leaves lanceolate, crenate; calyx of the fruit obtuse; styles five. The flowers are succeeded by red berries, which make a beautiful appearance through the winter. It is a native of France and Italy.

MENYA'NTHES. Buck-bean. In botany, a genus of the class pentandria, order monogynia: corol hairy; stigma cloven; capsule one-celled. Five species; one a native of the Cape; two of India; two of Europe, and found on the river banks or in the marshes of our own country. The following are the chief:

1. M. nymphæoides. Leaves cordate, repand; corols ciliate. Found on our river banks and in our rivers.

2. M. trifoliata. Leaves three on the same peticle. Found in our marshes.

3. M. cristata. Leaves cordate, with waved margin; corols crowned at the mouth of the tube only with white filaments; peticles with flower-bearing tubercles, leaves and roots a little below the top; peduncles one-flowered, flowers white; nectaries triple; below the filaments five yellow glandular bodies alternating with the stamens; and five hairy yellow bodies surrounding the base of the germ. A native of the East Indies.

MENZIE'RIA. In botany, a genus of the class octandria, order monogynia. Calyx one-leafed, repand; corol one-petalled; stamens inserted on the receptacle; capsule superior, four-celled, with the partitions from the inflected margins of the valves. One species; a branchy shrub of North America, with axillary, nodding, ferruginous flowers.

MENZIKOFF (Alexander), a prince of the Russian empire, was the son of a peasant, and the servant of a pastry-cook, who employed him to cry pies about the streets. His manners struck Peter the Great, who took him into his service, in which he behaved so as to gain the particular favour of that monarch. He was raised to the rank of major-general, and to the title of prince. He continued in the same degree of favour with the empress Catharine as he had with Peter the Great. Peter II. married the daughter of Menzikoff; but this served only to ruin him, for, intoxicated with the distinctions he had received, his conduct laid him open to the attacks of his enemies, and he fell into disgrace. He died in Siberia, whither he had been banished, in 1729.

MENZINI (Benedict), an Italian poet, born at Florence in 1646, and died in 1704.

He wrote a book entitled, Construzione irregolare della Lingua Toscana; and another, De Arte Poetica. His satires are esteemed good productions. All his works were printed after his death, in 4 vols. 8vo.

MEOTIS, or PALUS MEOTIS, a sea of Turkey which divides Europe from Asia; extending from Crim Tartary to the mouth of the river Don or Tanais.

MEPHITIC, a name expressing any kind of noxious vapour; but generally applied to that species of vapour called fixed air. See AIR, FIXED AIR, GAS, &c.

MEPHITIC GASS. See SEPTON.

MEPHI'TIS. (μεφιτις, from *mephuith*, Syr. a blast.) A poisonous exhalation. See CONTAGION.

MEPHITUS FANUM, a temple erected to the goddess Mephitis, near Lacus Amsancti; who was worshipped also at Cremona.

MEQUINENZA, a town of Spain, in the kingdom of Arragon, at the conflux of the Segre, the Cinca, and the Ebro. It is ancient, and defended by a castle, and was once the see of a bishop; thirty-eight miles S.S.W. Balbastro, and sixteen S.S.W. Lerida.

MEQUINEZ, a city of Africa, in the empire of Morocco, situated in a plain, surrounded with fertile vallies and eminences, watered by a number of rivers. It is surrounded with walls, and the palace is fortified with bastions; this is an extensive building, and includes several gardens. The Jews have a quarter appropriated to themselves, walled in and guarded. The Moors at Mequinez are much more affable than in the southern provinces. There is, both at Mequinez and Morocco, a hospital, or convent, of Spanish recollects, founded more than a hundred years ago, by the munificence of the kings of Spain, for the benefit and spiritual comfort of the Christian captives. These two convents are much respected in the country, both for the exemplary lives of the fathers and the service they are of to the poor, whom they supply with medicines gratis: twenty-six miles S.W. Fez, and 165 N.E. Morocco. Lon. 6. 6 W. Lat. 33. 16 N.

MERA'CIOUS. *a.* (*meracus*, Lat.) Strong; racy.

MERA'ZION, or MARKET JEW, a seaport in Cornwall, with a market on Thursday; seated on an arm of the sea, called Mounts-bay, three miles E. of Penzance, and 283 W. by S. of London. Lon. 5. 30 W. Lat. 50. 12 N.

ME'RCABLE. *a.* (*mercor*, Latin.) To be sold or bought.

ME'RCANTANT. *s.* (*mercantante*, Ital.) A foreigner, or foreign trader (*Shakspeare*).

ME'RCANTILE. *a.* Trading; commercial.

ME'RCAT. *s.* (*mercatus*, Latin.) Market; trade (*Sprat*).

MERCATOR (Gerard), one of the most celebrated geographers of his time, was born at Ruremonde in 1512. He applied himself with such industry to geography and mathematics, that he is said to have frequently forgot to eat and drink. The emperor Charles V. had a particular esteem for him, and the duke of Juliers made him his cosmographer. He composed a chronology, some geographical tables, an Atlas, &c. engraving and colouring the maps himself. He died in 1594.

MERCATOR (Nicholas), an eminent mathematician in the 17th century, was born at Holstein in Denmark; and came to England about the time of the restoration, where he lived many years. He was fellow of the Royal Society; and endeavoured to reduce astrology to rational principles, as appeared from a MS. of his in the possession of William Jones, Esq. He published several works, particularly Cosmographia. He gave the quadrature of the hyperbola by an infinite series; which was the first appearance in the learned world of a series of this sort drawn from the particular nature of the curve, and that in a manner very new and abstracted. For more particulars respecting this extraordinary man, see Hutton's Mathematical Dictionary.

MERCATOR'S CHART, or PROJECTION, is a projection of the surface of the earth in plano, so called from Gerard Mercator, a Flemish geographer, who first published maps of this sort in the year 1556; though it was Edward Wright who first gave the true principles of such charts, with their application to navigation, in 1599.

In this chart or projection, the meridians, parallels, and rhumbs, are all straight lines, the degrees of longitude being every where increased so as to be equal to one another, and having the degrees of latitude also increased in the same proportion; namely, at every latitude or point on the globe, the degrees of latitude, and of longitude, or the parallels, are increased in the proportion of radius to the sine of the polar distance, or cosine of the latitude; or, which is the same thing, in the proportion of the secant of the latitude to radius; a proportion which has the effect of making all the parallel circles be represented by parallel and equal right lines, and all the meridians by parallel lines also, but increasing infinitely towards the poles.

From this proportion of the increase of the degrees of the meridian, viz. that they increase as the secant of the latitude, it is very evident that the length of an arch of the meridian, beginning at the equator, is proportional to the sum of all the secants of the latitude, *i. e.* that the increased meridian, is to the true arch of it, as the sum of all those secants, to as many times the radius. But it is not so evident that the same increased meridian is also analogous to a scale of the logarithmic tangents, which however it is. It does not appear who it was that discovered the analogy between a scale of logarithmic tangents and Wright's protraction of the nautical meridian line, which consisted of the sums of the secants. It appears however to have been first published, and introduced into the practice of navigation, by Mr. Henry Bond, who mentions this property in an edition of Norwood's Epitome of Navigation, printed about 1645; and

he again treats of it more fully in an edition of Gunter's works, printed in 1653, where he teaches, from this property, to resolve all the cases of Mercator's Sailing by the logarithmic tangents, independent of the table of meridional parts. This analogy had only been found however to be nearly true by trials, but not demonstrated to be a mathematical property. Such demonstration, it seems, was first discovered by Mr. Nicholas Mercator, which he offered a wager to disclose, but this not being accepted, Mercator reserved his demonstration. The proposal however excited the attention of mathematicians to the subject, and demonstrations were not long wanting. The first was published about two years after, by James Gregory, in his Exercitationes Geometricæ; from hence, and other similar properties there demonstrated, he shews how the tables of logarithmic tangents and secants may easily be computed from the natural tangents and secants.

The same analogy between the logarithmic tangents and the meridian line, as also other similar properties, were afterwards more elegantly demonstrated by Dr. Halley, in the Philos. Trans. for Feb. 1696, and various methods given for computing the same, by examining the nature of the spirals into which the rhumbs are transformed in the stereographic projection of the sphere on the plane of the equator: the doctrine of which was rendered still more easy and elegant by Mr. Cotes in his Logometria.

MERCATOR'S SAILING, or more properly Wright's Sailing, is the method of computing the cases of sailing on the principles of Mercator's chart, which principles were laid down by Edward Wright in the beginning of the last century; or the art of finding on a plane the motion of a ship upon any assigned course, that shall be true as well in longitude and latitude, as distance; the meridians being all parallel, and the parallels of latitude straight lines. See NAVIGATION.

MERCATORUM FESTUM, was a festival kept by the Roman merchants on the 15th of May in honour of Mercury, who presided over merchandise. A sow was sacrificed on the occasion, and the people present sprinkled themselves with water fetched from the fountain called *aqua Mercurii*; the whole concluding with prayers to the god for the prosperity of trade.

ME'RCATURE. *s.* (*mercatura*, Lat.) The practice of buying and selling.

ME'RCENARINESS. *s.* (from *mercenary.*) Venality; respect to hire or reward (*Boyle*).

ME'RCENARY. *a.* (*mercenaire*, French.) 1. Venal; hired; sold for money (*Hayward*). 2. Too studious of profit (*South*).

ME'RCENARY. *s.* A hireling; one retained or serving for pay (*Sandys*).

ME'RCER. *s.* (*mercier*, French.) One who sells silks (*Howel*).

ME'RCERY. *s.* (*mercerie*, French.) Trade of mercers; traffic of silks (*Graunt*).

*To* ME'RCHAND. *v. n.* (*marchander*, Fr.) To transact by traffic (*Bacon*).

ME'RCHANDISE. *s.* (*marchandise*, Fr.) 1. Traffic; commerce; trade (*Taylor*). 2. Wares; any thing to be bought or sold.

*To* ME'RCHANDISE. *v. n.* To trade; to traffic; to exercise commerce (*Brerewood*).

ME'RCHANT. *s.* (*marchand*, French.) One who traffics to remote countries (*Addis.*).

ME'RCHANTABLE. *a.* (from *merchant.*) Fit to be bought or sold (*Brown*).

ME'RCHANTLIKE. ME'RCHANTLY. *a.* Like a merchant (*Ainsworth*).

ME'RCHANT-MAN. *s.* A ship of trade.

MERCHET (*mercheium*), a fine or composition paid by inferior tenants to the lord, for liberty to dispose of their daughters in marriage. No baron, or military tenant, could marry his sole daughter and heir, without such leave purchased from the king, *pro maritanda filia*. And many of our servile tenants could neither send their sons to school, nor give their daughters in marriage, without express leave from the superior lord. See Kennet's Glossary, in Maritagium. See also MARCHET.

MERCIA, the name of one of the seven kingdoms founded in England by the Saxons. Though the latest formed, it was the largest of them all, and grew by degrees to be by far the most powerful. On the north it was bounded by the Humber and the Mersey, which separated it from the kingdom of Northumberland; on the east by the sea, and the territories of the East-Angles and Saxons; on the south by the river Thames; and on the west by the rivers Severn and Dee. It comprehended well nigh seventeen of our modern counties, being equal in size to the province of Languedoc in France; very little, if at all, less than the kingdom of Arragon in Spain; and superior in size to that of Bohemia in Germany.

Penda is regarded as its first monarch; and the kingdom is thought to derive its name from the Saxon word *merc*, which signifies a march, bound, or limit, because the other kingdoms bordered upon it on every side; and not from the river Mersey, as some would persuade us. Penda assumed the regal title A. D. 626, and was of the age of 50 at the time of his accession; after which he reigned near 30 years.

MERCIER (John), a French philosopher, was a native of Languedoc, and died in 1562. He succeeded Varablus as professor of Hebrew in the royal college of Paris. His works chiefly consist of Commentaries on the Old Testament, and a Chaldee grammar.

ME'RCIFUL. *a.* (*mercy* and *full.*) Compassionate; tender; kind; unwilling to punish; willing to pity and spare (*Deut.*).

ME'RCIFULLY. *ad.* Tenderly; mildly; with pity; with compassion (*Atterbury*).

ME'RCIFULNESS. *s.* (from *merciful.*) Tenderness; willingness to spare (*Hammond*).

ME'RCILESS. *a.* (from *mercy.*) Void of mercy; pitiless; hardhearted; cruel (*Denham*).

ME'RCILESSLY. *ad.* (from *merciless.* In a manner void of pity.

MERCILESSNESS. *s.* (from *merciless.*) Want of pity.

MERCURIAL. *a.* (*mercurialis*, Latin.) 1. Formed under the influence of Mercury; active; sprightly (*Bacon*). 2. Consisting of quicksilver.

MERCURIALIS (Jerom), an eminent Italian physician, born at Forli in 1530, where he first practised; but afterwards was professor of medicine successively at Padua, Bologna, and Pisa. His writings in physic are very numerous; besides giving an edition of Hippocrates in Greek and Latin, with notes, which, however, did not answer the expectations of the learned. He died in 1606; and in 1644 some pieces of his were published at Venice in one volume folio.

MERCURIALIS. Mercury. In botany, a genus of the class diœcia, order caneandria. Calyx three-parted; corolless. Male: stamens from nine to twelve; anthers globular, twin. Fem.: styles two; berry two-grained, two-celled; seeds one in each cell. Six species; four European; one Cochin Chinese; one a Cape plant: two common to our own wastes and hedges: these last are as follow:

1. M. perennis. Stem quite simple; leaves rough; root creeping. Found wild in our hedges: when very young an innoxious esculent; but towards the middle of summer and autumn, highly poisonous; and has often produced great mischief by having been mistaken for chenopodium. M. perennis is described by many botanists under the name of cynocrambe.

2. M. annua. Stem cross-armed; leaves glabrous; flowers racemed; roots fibrous. It is used as a purgative under various forms by the French, chiefly as a syrup, and in enemas.

MERCURIUS, a celebrated god of antiquity, called Hermes by the Greeks. There were no less than five of this name, according to Cicero. Some add a sixth, but to the son of Jupiter and Maia, the actions of all the others have been probably attributed. Mercury was the messenger of the gods, and of Jupiter in particular; the patron of travellers and of shepherds; he conducted the souls of the dead into the infernal regions, and not only presided over orators, merchants, declaimers, but he was also the god of thieves, pickpockets, and all dishonest persons. His name is derived *a mercibus*, because he was the god of merchandise among the Latins. He was born in Arcadia, on mount Cyllene. The day that he was born, he gave proof of his craftiness in stealing away the oxen of Admetus, which Apollo tended. He gave other proofs of his thievish propensity, by taking also the quiver and arrows of Apollo; and he increased his fame by robbing Neptune of his trident, Venus of her girdle, Mars of his sword, Jupiter of his sceptre, and Vulcan of many of his mechanical instruments. Jupiter then took him as his messenger, interpreter, and cup-bearer. He was presented by the king of heaven with a winged cap, called petasus, and with wings for his feet, called talaria. As messenger of Jupiter, he was entrusted with all his secrets, and was the ambassador and plenipotentiary of the gods. The invention of the lyre and its seven strings is ascribed to him. This he gave to Apollo, and received in exchange the celebrated caduceus with which the god of poetry used to drive the flocks of king Admetus. (See CADUCEUS.) He delivered Mars from the long confinement which he suffered from the superior power of the Aloides. He purified the Danaides of the murder of their husbands; he tied Ixion to his wheel in the infernal regions; he destroyed the hundred-eyed Argus; he sold Hercules to Omphale, the queen of Lydia; he conducted Priam to the tent of Achilles to redeem the body of his son Hector. Mercury had many surnames and epithets; his amours were also numerous. His worship was well established, particularly in Greece, Egypt, and Italy. The Roman merchants yearly celebrated a festival on the 15th of May, in honour of Mercury, in a temple near the Circus Maximus. Here they intreated him to forgive whatever artful measures, false oaths, or falsehoods they had used or uttered in the pursuit of gain. The chief ensigns of his power and offices are his caduceus, his petasus, and his talaria. Some of his statues represented him as a youth. The Greeks and Romans offered tongues to him, by throwing them into the fire, as he was the patron of speaking, of which the tongue is the organ.

MERCURIUS TRISMEGISTES, a priest and philosopher of Egypt, who taught his countrymen how to cultivate the olive, measure their lands, and to understand hieroglyphics. He lived in the age of Osiris, and wrote 40 books on theology, medicine, and geography, from which Sanchoniathon the Phœnician historian has taken his theogonia.

MERCURIUS. (*mercurius*, the chemical name of quicksilver, from its activity.) In pharmacy. See HYDRARGYRUS.

MERCURIUS ACETATUS. See HYDRARGYRUS ACETATUS.

MERCURIUS CALCINATUS. See HYDRARGYRUS CALCINATUS.

MERCURIUS CORROSIVUS. See HYDRARGYRUS MURIATUS.

MERCURIUS CORROSIVUS RUBER. See HYDRARGYRUS NITRATUS RUBER.

MERCURIUS CORROSIVUS SUBLIMATUS. See HYDRARGYRUS MURIATUS.

MERCURIUS EMETICUS FLAVIUS. See HYDRARGYRUS VITRIOLATUS.

MERCURIUS PRÆCIPITATUS ALBUS. See CALX HYDRARGYRI ALBA.

MERCURIUS PRÆCIPITATUS DULCIS. See HYDRARGYRUS MURIATUS MITIS.

MERCURIUS PRÆCIPITATUS RUBER. See HYDRARGYRUS NITRATUS RUBER.

MERCURY, the smallest of the inferior planets, and the nearest to the sun, about which it is carried with a very rapid motion. Hence it was, that the Greeks called this planet after the name of the nimble messenger of the gods, and represented it by the figure of a

youth with wings at his head and feet; from whence is derived ☿, the character in present use for this planet.

The mean distance of Mercury from the sun, is to that of the earth from the sun, as 387 to 1000, and therefore his distance is about 36 millions of miles, or little more than one-third of the earth's distance from the sun. See Astronomy.

Mercury. (*mercurius*, Lat.; so denominated by the chemists from its volatility.) Hydrargyrum. Argentum vivum. Quicksilver. Under the article Hydrargyrum we have considered this metal mineralogically, and pharmaceutically; have explained its characters; enumerated its ores; and treated of its medicinal preparations. We shall consider it in a chemical and metallurgic point of view. The colour of mercury is white, and similar to that of silver; hence the names hydrargyrus, argentum vivum, quicksilver, by which it has been known in all ages. It has no taste nor smell. It possesses a good deal of brilliancy; and when its surface is not tarnished, makes a very good mirror. Its specific gravity is 13.568. At the common temperature of the atmosphere, it is always in a state of fluidity. In this respect it differs from all other metals. But it becomes solid when exposed to a sufficient degree of cold. The temperature necessary for freezing this metal is —39°, as was ascertained by the experiments of Mr. Macnab, at Hudson's-bay. The congelation of mercury was accidentally discovered by the St. Petersburgh academicians in 1759. Taking the advantage of a very severe frost, they plunged a thermometer into a mixture of snow and salt, in order to ascertain the degree of cold. Observing the mercury stationary, even after it was removed from the mixture, they broke the bulb of the thermometer, and found the metal frozen into a solid mass. This experiment has been repeated very often since, especially in Britain. Mercury contracts considerably at the instant of freezing; a circumstance which misled the philosophers who first witnessed its congelation. The mercury in their thermometers sunk so much before it froze, that they thought the cold to which it had been exposed much greater than it really was. It was in consequence of the rules laid down by Mr. Cavendish, that Mr. Macnab was enabled to ascertain the real freezing point of the metal.

Solid mercury may be subjected to the blows of a hammer, and may be extended without breaking. It is therefore malleable; but neither the degree of its malleability, nor its ductility, nor its tenacity, has been ascertained.

Mercury boils when heated to 660°. It may therefore be totally evaporated, or distilled from one vessel into another. It is by distillation that mercury is purified from various metallic bodies, with which it is often contaminated. The vapour of mercury is invisible and elastic like common air; like air, too, its elasticity is indefinitely increased by heat, so that it breaks through the strongest vessel. Geoffroy, at the desire of an alchymist, inclosed a quantity of it in an iron globe, strongly secured by iron hoops, and put the apparatus into a furnace. Soon after the globe became red-hot, it burst with all the violence of a bomb, and the whole of the mercury was dissipated.

Mercury is not altered by being kept under water. When exposed to the air, its surface is gradually tarnished, and covered with a black powder, owing to its combining with the oxygen of the atmosphere. But this change goes on very slowly, unless the mercury is either heated or agitated, by shaking it, for instance, in a large bottle full of air. By either of these processes, the metal is converted into an oxyd: by the last, into a black-coloured oxyd; and by the first, into a red-coloured oxyd. This metal does not seem to be capable of combustion.

The oxyds of mercury at present known are four in number.

1. The protoxyd was first described with accuracy by Boerhaave. He formed it by putting a little mercury into a bottle, and tying it to the spoke of a mill-wheel. By the constant agitation which it thus underwent, it was converted into a black powder, to which he gave the name of *ethiops per se*. This oxyd is readily formed by agitating pure mercury in a phial. It is a black powder without any of the metallic lustre, has no taste, and is insoluble in water. According to the experiments of Fourcroy, it is composed of 96 parts of mercury and four of oxygen. When this oxyd is exposed to a strong heat, oxygen gass is emitted, and the mercury reduced to the metallic state. In a more moderate heat it combines with an additional dose of oxygen, and assumes a red colour.

2. When mercury is dissolved in nitric acid without the assistance of heat, and the acid is made to take up as much mercury as possible, it has been demonstrated, by the experiments of Mr. Chenevix, that it combines in that case with 10.7 per cent. of oxygen. Of course an oxyd is formed, composed of 89.3 mercury and 10.7 oxygen. This is the deutoxyd of mercury. This oxyd cannot be separated completely from the acid which holds it in solution without undergoing a change in its composition; of course we are at present ignorant of its colour and other properties. Indeed it is very probable that it is the same with the black oxyd just described under the name of protoxyd; but this has not yet been proved in a satisfactory manner.

3. When mercury, or its protoxyd, is exposed to a heat of about 600°, it combines with additional oxygen, assumes a red colour, and is converted into an oxyd, which, in the present state of our knowledge, we must consider as a tritoxyd. This oxyd may be formed two different ways: 1. By putting a little mercury into a flat-bottomed glass bottle or matrass, the neck of which is drawn out into a very narrow tube, putting the matrass into a sand-bath, and keeping it constantly at the boiling point. The height of the matrass, and the smallness of its mouth, prevent the mercury from making its

escape, while it affords free access to the air. The surface of the mercury becomes gradually black, and then red, by combining with the oxygen of the air: and at the end of several months the whole is converted into a red powder, or rather into small crystals, of a very deep red colour. The oxyd, when thus obtained, was formerly called precipitate per se. 2. When mercury is dissolved, in nitric acid, evaporated to dryness, and then exposed to a pretty strong heat in a porcelain cup, it assumes, when triturated, a brilliant red colour. The powder thus obtained was formerly called red precipitate, and possesses exactly the properties of the oxyd obtained by the former process.

This oxyd has an acrid and disagreeable taste, possessing poisonous qualities, and acts as an escharotic when applied to any part of the skin. It is somewhat soluble in water. When triturated with mercury it gives out part of its oxygen, and the whole mixture is converted into protoxyd or black oxyd of mercury. When heated along with zinc, or tin filings, it sets these metals on fire. According to Fourcroy, it is composed of 92 parts of mercury and 8 of oxygen. But the analysis of Mr. Chenevix, to be described hereafter, gives for the proportion of its component parts, 85 parts of mercury and 15 parts of oxygen.

The red oxyd of mercury, prepared in the usual way, is not pure, but always contains a portion of nitric acid. If we dissolve it in muriatic acid, and precipitate it again, it falls in the state of a white powder, and retains a portion of muriatic acid. It was in this state that it was examined by Chenevix. The difficulty of procuring this oxyd in a state of purity, and the uncertainty respecting the proportion of acid which it retains, may, in some measure, account for the different results obtained by different chemists in their attempts to ascertain its proportions.

4. Fourcroy has observed, that when oxymuriatic acid gass is made to pass through the red oxyd of mercury, it combines with an additional dose of oxygen, and is converted into a peroxyd; but as this peroxyd cannot be procured in a separate state, we are ignorant of its properties.

Mercury does not combine with carbon or hydrogen; but it unites readily with sulphur and with phosphorus.

When two parts of sulphur and one of mercury are triturated together in a mortar, the mercury gradually disappears, and the whole assumes the form of a black powder, formerly called ethiops mineral. It is scarcely possible by any process to combine the sulphur and mercury so completely, that small globules of the metal may not be detected by a microscope. When mercury is added slowly to its own weight of melted sulphur, and the mixture is constantly stirred, the same black compound is formed.

Fourcroy has suggested, that in this compound the mercury is in the state of black oxyd, absorbing the necessary portion of oxygen from the atmosphere during its combination with the sulphur. But the late experiments of Proust have shewn that this is not the case. Berthollet has made it probable that ethiops mineral contains sulphureted hydrogen. Hence we must consider it as composed of three ingredients, namely, mercury, sulphur, and sulphereted hydrogen. Such compounds are at present denominated by chemists hydrogenous sulphurets. Ethiops mineral of course is an hydrogenous sulphuret of mercury. When this substance is heated, part of the sulphur is dissipated, and the compound assumes a deep violet colour.

When heated red-hot, it sublimes; and if a proper vessel is placed to receive it, a cake is obtained of a fine red colour. This cake was formerly called cinnabar; and when reduced to a fine powder, is well known in commerce under the name of vermilion. It has been hitherto supposed a compound of the oxyd of mercury and sulphur. But the experiments of Proust have demonstrated that the mercury which it contains is in the metallic state. According to that very accurate chemist, it is composed of 85 parts of mercury and 15 of sulphur. It is therefore sulphuret of mercury.

The sulphuret of mercury has a scarlet colour, more or less beautiful, according to the mode of preparing it. Its specific gravity is about 10. It is tasteless, insoluble in water, and in muriatic acid, and not altered by exposure to the air. When heated sufficiently, it takes fire, and burns with a blue flame. When mixed with half its weight of iron filings, and distilled in a stone-ware retort, the sulphur combines with the iron, and the mercury passes into the receiver, which ought to contain water. By this process mercury may be obtained in a state of purity. The use of sulphuret of mercury as a paint is well known.

Mr. Pelletier, after several unsuccessful attempts to combine phosphorus and mercury, at last succeeded by distilling a mixture of red oxyd of mercury and phosphorus. Part of the phosphorus combined with the oxygen of the oxyd, and was converted into an acid; the rest combined with the mercury. He observed that the mercury was converted into a black powder before it combined with the phosphorus. As Pelletier could not succeed in his attempts to combine phosphorus with mercury in its metallic state, we must conclude that it is not with mercury, but with the black oxyd of mercury, that the phosphorus combines. The compound, therefore, is not phosphorus of mercury, but black phosphurated oxyd of mercury.

It is of a black colour, of a pretty solid consistence, and capable of being cut with a knife. When exposed to the air, it exhales vapours of phosphorus.

Mercury does not combine with the simple incombustibles.

Mercury combines with the greater number of metals. These combinations are known in chemistry by the name of amalgams.

The amalgam of gold is formed very readily,

because there is a very strong affinity between the two metals. If a bit of gold is dipped into mercury, its surface, by combining with mercury, becomes as white as silver. The easiest way of forming this amalgam is to throw small pieces of red-hot gold into mercury. The proportions of the ingredients are not determinable, because the amalgam has an affinity both for the gold and the mercury; in consequence of which they combine in any proportion. This amalgam is white, with a shade of yellow; and when composed of six parts of mercury and one of gold, it may be obtained crystallized in four-sided prisms. It melts at a moderate temperature; and when heated sufficiently, the mercury evaporates, and leaves the gold in a state of purity. It is much used in gilding. The amalgam, composed of ten parts of mercury and one of gold, is spread upon the metal which is to be gilt: and then, by the application of a gentle and equal heat, the mercury is driven off, and the gold left adhering to the metallic surface; this surface is then rubbed with a brass-wire brush under water, and afterwards burnished.

Dr. Lewis attempted to form an amalgam of platinum, but hardly succeeded after a labour which lasted for several weeks. Guyton Morveau succeeded by means of heat. He fixed a small cylinder of platinum at the bottom of a tall glass vessel, and covered it with mercury. The vessel was then placed in a sand-bath, and the mercury kept constantly boiling. The mercury gradually combined with the platinum; the weight of the cylinder was doubled, and it became brittle. When heated strongly, the mercury evaporated, and left the platinum partly oxidated. It is remarkable, that the platinum, notwithstanding its superior specific gravity, always swam upon the surface of the mercury, so that Morveau was under the necessity of fixing it down.

The amalgam of silver is made in the same manner as that of gold, and with equal ease. It forms dentrical crystals, which according to the Dijon academicians contain eight parts of mercury and one of silver. It is of a white colour, and is always of a soft consistence. Its specific gravity is greater than the mean of the two metals. Gellert has even remarked that, when thrown into pure mercury, it sinks to the bottom of that liquid. When heated sufficiently, the mercury is volatilized, and the silver remains behind pure.

The affinities of mercury as ascertained by Morveau, and of its oxyds as exhibited by Bergman, are in the following order:

| Mercury. | Oxyd of Mercury. |
|---|---|
| Gold, | Muriatic acid, |
| Silver, | Oxalic, |
| Tin, | Succinic, |
| Lead, | Arsenic, |
| Bismuth, | Phosphoric, |
| Platinum, | Sulphuric, |
| Zinc, | Saclactic, |
| Copper, | Tartaric, |
| Antimony, | Citric, |
| Arsenic, | Sulphurous, |
| Iron. | Nitric, |
| | Fluoric, |
| | Acetic, |
| | Boracic, |
| | Prussic, |
| | Carbonic. |

*Analysis and assay.*—There are no very exact analysis of any of the mercurial ores, but the following methods of examining them seem to be liable to little objection.

Native mercury and native amalgam may be thus analyzed. Let the ore be digested in moderately strong nitric acid, which will take up the mercury and silver and bismuth if there should happen to be any present; a minute quantity of gold may also be contained in the argentiferous mercury which will be left untouched at the bottom of the solution in the form of a brown powder. The nitrous solution being concentrated by gentle evaporation till it is on the point of crystallizing, is to be poured on a large quantity of pure water, by which the bismuth will for the most part be separated. Then add to the filtered liquor a solution of common salt or any other neutral muriat, by which both the silver and mercury will be thrown down in the state of muriat. This being separated, drop into the clear liquor some carbonated alkali as long as any precipitate takes place; then boil the liquor, and separate the precipitate by filtration. The muriatic precipitate is now to be digested in moderately diluted nitro-muriatic acid, which will take up every thing but the muriat of silver, from which, when washed and dried, the amount of silver in the ore may be readily ascertained. Now decompose the nitro-muriatic solution at a boiling heat by carbonated alkali, and add the white precipitate thus obtained to the other carbonated precipitate. Mix these with a little oil or sugar (the latter is the best), and proceed to distillation in a small coated glass retort; raise it gradually to ignition, and continue it at that temperature as long as any mercury comes over. What remains behind is a little metallic bismuth and charcoal.

Cinnabar may be analyzed thus: after being reduced to a fine powder, let it be digested repeatedly in a mixture of three parts muriatic acid, and one nitric, the whole moderately diluted: by this every thing will be taken up except the sulphur and the silex. This residue being washed, dried and weighed, is to be ignited, and the remaining silex being deducted, the difference of weight indicates the amount of the sulphur. The nitro-muriatic solution being decomposed by carbonated alkali at a boiling heat, and the precipitate thus obtained being mixed with a little lamp-black and distilled, the mercury will pass over in the metallic state: what remains in the retort is magnetic oxyd of iron, and the casual earth (excepting silex) contained in the ore, together with a little charcoal, which may be separated in the usual way.

The liver-coloured and bituminous ores may be treated exactly in the same manner.

The assay of mercurial ores in the dry way is very simple. The specimen being pulverised, and accurately mixed with a fourth of its weight of quick-lime and an equal portion of iron filings, is to be pretty strongly ignited in an iron or earthen retort as long as any mercury comes over into the receiver.

*Reduction of ores.*—The methods of extracting the metal from the ores of mercury are very simple. The following, which is the best and most scientific, is that practised at the mines of Deux-Ponts and of Idria. The ore being brought out of the mine is sorted by hand with considerable accuracy, rejecting those parts that appear destitute of metal. This is an expensive and rather tedious process, but has superseded the ancient method of separating the cinnabar by washing, on account of the prodigious loss of metal in that operation. The solid ore being reduced to powder is carefully mingled with a fifth, more or less according to the proportion of mercury contained in the ore, of quick-lime which has fallen into powder by exposure to the air. This mixture is then put into iron retorts capable of holding about 60lbs. weight, which, when thus charged, are fixed in a long furnace to the number of forty or fifty: a glass receiver being then attached to each retort, but not luted, a gentle fire is applied, in order to drive out all the moisture. When this is effected, the juncture of the vessels is closely stopped with tempered clay, and a full red heat is applied for seven or eight hours, at the expiration of which time all the mercury will have been volatilized and condensed in the receiver. The common produce varies between six and ten ounces of metal from 100lbs. of the ore.

At Almaden in Spain a very different method is practised, much more rude and inartificial. It is indeed somewhat less expensive, but accompanied with a great comparative loss of metal: and hence is scarcely worth detailing.

On account of the fluidity of mercury, it cannot be conveyed from place to place without extraordinary precautions. The method of packing it is as follows: A fresh sound sheepskin, with the hair taken off, is laid over a wooden bowl, and from 50lbs. to 75lbs. of mercury are poured into it: the ends of the skin are then gathered up, and tied together with great care, thus forming a sort of bag, in which the metal is inclosed; this bag is inclosed in a second, and this second in a third; lastly, these bags are put into very tight barrels, capable of holding from two to four of them, and in this state are brought into the market.

Mercury (English), in botany. See Chenapodium.

MERCY. *s.* (*merci*, French.) 1. Tenderness; goodness; pity; willingness to spare and save; clemency; mildness; unwillingness to punish (*Psalms*). 2. Pardon (*Dryden*). 3. Discretion; power of acting at pleasure (*Shakspeare*).

Mercy seems to rise upon clemency. We crave clemency for a breach of the laws; and implore mercy for mortal sins. Thus, we pray to God for mercy; petition a prince for clemency.

Shakspeare, if he do not always discriminate with verbal accuracy, yet often describes with exquisite beauty: as in the following passages.

"The quality of mercy is not strain'd;
It droppeth as the gentle rain from heaven
Upon the place beneath. It is twice bless'd;
It blesseth him that gives, and him that takes.
'Tis mightiest in the mightiest: it becomes
The throned monarch better than his crown:
His sceptre shows the force of temporal power,
The attribute to awe and majesty;
Wherein doth sit the dread and fear of kings:
It is an attribute to God himself;
And earthly pow'r doth then shew likest God's
When mercy seasons justice.
We do pray for mercy;
And that same pray'r doth teach us all to render
The deeds of mercy."
(*Merchant of Venice.*)

Again, in Measure for Measure:

——"Alas! Alas!
Why all the souls that are, were forfeit once;
And he, that might the 'vantage best have took,
Found out the remedy. How would you be,
If he, which is the top of judgement, should
But judge you as you are? Oh, think on that;
And mercy then will breathe within your lips,
Like man new made."

Mercy-seat. *s.* The covering of the ark of the covenant, in which the tables of the law were deposited: it was of gold, and at its two ends were fixed the two cherubim, of the same metal, which, with their wings extended forward, seemed to form a throne (*Exodus*).

MERDA. (from μειρω, to separate.) Dung; excrement.

MERDIN, a town of Turkey, in Diarbeck, with a castle and an archbishop's see. The country about it produces a great deal of cotton. It is 45 miles S.E. of Diarbekar. Lon. 39. 59 E. Lat. 36. 50 N.

MERE. *a.* (*merus*, Latin.) That or this only; such and nothing else; this only (*Atterbury*).

Mere, or Mer, signify the same with the Saxon mere, a pool or lake (*Gibson*).

Mere. *s.* (mere, Saxon.) 1. A pool; commonly a large pool or lake. 2. A boundary (*Bacon*).

Mere, a town in Wiltshire, with a market on Tuesday, 28 miles W. of Salisbury, and 100 W. by S. of London. Lon. 2. 25 W. Lat. 51. 6 N.

MERECZ, a town of Lithuania, seated at the confluence of the Berezino and Merecz, 30 miles N. of Grodno. Lon. 24. 10 E. Lat. 50. 0 N.

ME'RELY. *ad.* (from *mere.*) Simply; only; thus and no other way (*Swift*).

MERETRI'CIOUS. *a.* (*meretricius*, Lat.) Whorish; such as is practised by prostitutes; alluring by false shew (*Roscommon*).

MERETRI'CIOUSLY. *ad.* Whorishly; after the manner of whores.

MERETRI'CIOUSNESS. *s.* (from *meretricious.*) False allurement like that of strumpets.

MERGANSER. See MERGUS.

MERGENTHEIM, a town of Franconia, subject to the grand master of the Teutonic order; and seated on the Tauber, 16 miles S.W. of Wurtzburg. Lon. 8. 50 E. Lat. 49. 30 N.

MERGUI, the capital of a province of the kingdom of Siam, situate on an island, near the coast, with an harbour which is said to be one of the best in the East Indies. Lon. 98. 28 E. Lat. 12. 6 N.

MERGUS, in zoology, a genus of the class aves, order anseres. Bill toothed, slender, cylindrical, hooked at the point; nostrils small, oval, in the middle of the bill; feet four-toed, the outer toe longest. Ten species; five common to our own country, the rest natives of Europe or America.

1. M. cucullatus. Crested merganser. Crest globular, white on each side; body above brown, beneath white.

2. M. merganser. Goosander. Subcrested; white; head, neck, upper part of the breast and wings glossy black; tail cinereous. Feeds on fish; flesh rancid. Sometimes builds on trees, but generally among rocks.

3. M. castor. Dun-diver. Crested, cinereous; head and upper part of the neck bay; chin, middle-quill feathers and belly white.

4. M. serrator. Red-breasted merganser. Crest pendent; breast variegated with reddish; collar white; tail-feathers brown, varied with cinereous. Two other varieties from variety of colouring marks.

5. M. imperialis. Imperial goosander. Varied with black, brown and grey; head smooth; first quill-feathers black; without wing-spot; bills and legs reddish-white. Inhabits Sardinia: size of a goose.

6. M. albellus. Smew. White nun. Crest pendent; hind-head black; body white; back and temples black; wings variegated.

7. M. minutus. Minute marganser. Brownash, beneath and chin white; head and upper part of the neck ferruginous: wing-spot white before and behind. Fourteen inches and a half long.

8. M. furcifer. Fork-tailed merganser. Black; head smooth; hind-head, neck, vent, belly and lateral tail-feathers white; front and cheeks pale brown; tail forked.

9. M. fuscus. Brown merganser. Crested; brown, beneath white; chin and breast spotted with black; wings black with a white band.

10. M. cæruleus. Blue merganser. Crested; blue; crown and tail black; chin, belly and spot on the wings white.

These birds, with few exceptions, are of a middle size between that of a goose and of a duck. The edges of both mandibles are serrated: the tongue is thick, set with small bristles, pointing backward; an happy contrivance for holding the slippery fishes, which form their prey, and conducting them into the bird's throat. They swallow, with an undistinguishing voracity, fishes, that are by far too large to enter entire into the stomach; and hence, while the one end is digesting in the œsophagus, the other often remains in the throat.

The head and back of the merganser are black, beautified with a gloss of green. The lower parts of the body are white, the breast tending to a pale yellow. The tail is grey: the eyes, feet, and part of the bill, are red. As this bird is obliged to search for its food by diving, it is capable of remaining a long time under water; and, for this purpose, is furnished with a quantity of air, lodged in a cavity of its body, to serve the purpose of respiration, while it remains below.

The mergansers, from their voracity, and their expertness in swimming, are, perhaps, the most destructive of all birds that plunder the waters: while their flesh, which is dry, and of a bad flavour, makes but a small compensation for the devastations which they commit.

Some of them build in trees: but the greater part in rocks, jutting over precipitous forelands. One or two species are said to have been found as high up the North seas as Iceland, but this is uncommon. In all the species the female is of a smaller size than the male, and differs considerably in the distribution of her colours. Her head is red; and the mantle, or back and neck-feathers, grey. The white nun is the most beautiful of the whole tribe: the white plumage of the fore-parts and the black mantle that covers its back are each perfect in their kind: the tuft of small detached feathers, white upon the crown, but of a dark green shaded with purple upon the hind-part, produces a very elegant effect; while to complete this modest and religious dress of the white nun, the lower part of the neck is half surrounded with a collar of long silky feathers like velvet.

MERIAN (Maria Sibylla), an eminent female painter, was the daughter of an engraver, and born at Frankfort in 1647. Her genius led her to paint reptiles, flowers, and insects, which she designed after nature with a most scrupulous exactness. She even undertook a voyage to Surinam, to paint the insects and reptiles which are peculiar to that climate, and, at her return home, published 2 volumes of engravings after her designs. She died in 1717. Her daughter, Dorothea Henrietta Graff, painted in the same style, and accompanied her mother to Surinam.

MERIANA, in botany, a genus of the class decandria, order monogynia. Calyx five-cleft,

campanulate; petals five, inserted into the calyx; stamens declined; capsules five-celled, many seeded. Two species; Jamaica plants; the rhexia of Swartz.

MERIDA, a strong town of Spain, in Estramadura, built by the Romans, before the birth of Christ. Here are fine remains of antiquity, particularly a triumphal arch. It is seated in an extensive and fertile plain, 45 miles S. by E. of Alcantara. Lon. 6. 4 W. Lat. 38. 42 N.

MERIDA, a town of New Spain, capital of the province of Jucatan, with a bishop's see. It is inhabited by Spaniards and native Americans; and is 30 miles S. of the gulf of Mexico, and 120 N.E. of Campeachy. Lon. 89. 58 W. Lat. 20. 45 N.

MERIDA, a town of New Granada, seated in a country abounding with all kinds of fruits, 130 miles N.E. of Pampeluna. Lon. 71. 0 W. Lat. 8. 30 N.

MERI'DIAN. *s.* (*meridien*, French.) 1. Noon; midday (*Dryden*). 2. The line drawn from north to south, which the sun crosses at noon (*Watts*). 3. The particular place or state of any thing. 4. The highest point of glory or power (*Shakspeare*).

MERI'DIAN. *a.* 1. Being at the point of noon (*Milton*). 2. Extended from north to south (*Boyle*). 3. Raised to the highest point.

MERIDIAN, in astronomy, is a great circle of the celestial sphere, passing through the poles of the world, and both the zenith and nadir, crossing the equinoctial at right angles, and dividing the sphere into two equal parts, or hemispheres, the one eastern and the other western. Or, the meridian is a vertical circle passing through the poles of the world.

It is called meridian, from the Latin *meridies*, midday or noon, because when the sun comes to the south part of this circle, it is noon to all those places situated under it.

MERIDIAN, in geography, is a great circle passing through the poles of the earth, and any given place whose meridian it is; and it lies exactly under, or in the plane of, the celestial meridian.

These meridians are various, and change according to the longitude of places; so that their number may be said to be infinite, for that all places from east to west have their several meridians. Farther, as the meridian invests the whole earth, there are many places situated under the same meridian. Also, as it is noon whenever the centre of the sun is in the celestial meridian; and as the meridian of the earth is in the plane of the former; it follows, that it is noon at the same time, in all places situated under the same meridian.

MERIDIAN (First), is that from which the rest are counted, reckoning both east and west; and is the beginning of longitude.

The fixing of the first meridian is a matter merely arbitrary; and hence different persons, nations, and ages, have fixed it differently: from which circumstance some confusion has arisen in geography. The rule among the ancients was, to make it pass through the place farthest to the west that was known. But the moderns knowing that there is no such place on the earth as can be esteemed the most westerly, the way of computing the longitudes of places from one fixed point is much laid aside.

Ptolemy assumed the meridian that passes through the farthest of the Canary Islands, as his first meridian; that being the most western place of the world then known. After him, as more countries were discovered in that quarter, the first meridian was removed farther off. The Arabian geographers chose to fix the first meridian upon the utmost shore of the western ocean. Some fixed it to the island of St. Nicholas near the Cape Verd; Hondius to the isle of St. James; others to the island of Del Corvo, one of the Azores; because on that island the magnetic needle at that time pointed directly north, without any variation: and it was not then known that the declination of the needle is itself subject to variation. The latest geographers, particularly the Dutch, have pitched on the Pike of Teneriffe; others on the Isle of Palm, another of the Canaries; and lastly, the French, by order of the king, on the island of Fero, another of the Canaries.

But, without much regard to any of these rules, geographers and map-makers often assume the meridian of the place where they live, on the capital of their country, or its chief observatory, for a first meridian; and from thence reckon the longitudes of places, east and west.

MERIDIAN ON A GLOBE. See GLOBE.

MERIDIAN LINE, an arch, or part of the meridian of the place, terminated each way by the horizon. Or, a meridian line is the intersection of the plane of the meridian of the place with the plane of the horizon, often called a north-and-south line, because its direction is from north to south.

*To draw a meridian line.*—There are many ways of doing this; but some of the easiest and simplest are as follow:

1. On an horizontal plane describe several concentric circles AB, *ab*, &c. (fig. 3 Pl. 103.) and on the common centre C erect a stile, or gnomon, perpendicular to the horizontal plane, of about a foot in length. About the 21st of June, between the hours of 9 and 11 in the morning, and between 1 and 3 in the afternoon, observe the points A, *a*, B, *b*, &c. in the circles, where the shadow of the stile terminates. Bisect the arches AB, *ab*, &c. in D, *d*, &c. If then the same right line DE bisect all these arches, it will be the meridian line sought.

As it is not easy to determine precisely the extremity of the shadow, it will be best to make the stile flat at top, and to drill a small hole through it, noting the lucid point projected by it on the arches AB and *ab*, instead of marking the extremity of the shadow itself.

2. Another method is thus: Knowing the south quarter pretty nearly, observe the altitude FE of some star on the east side of it, and not far from the meridian HZRN: (fig. 4. Pl. 103.) then, keeping the quadrant firm on its

axis, so as the plummet may still cut the same degree, direct it to the western side of the meridian, and wait till you find the star has the same altitude as before, as *fe*. Lastly, bisect the angle EC*e*, formed by the intersection of the two planes in which the quadrant has been placed at the time of the two observations, by the right line HR, which will be the meridian sought.

Many other methods are given by authors, of describing a meridian line; as by the pole star, or by equal altitudes of the sun, &c.; by Schooten in his Exercitationes Geometriæ; Grey, Derham, &c. in the Philos. Trans.; by Ferguson in his Lectures on Select Subjects. See also Leybourn in his Dialling, p. 31; and Hutton's Ozanam's Recreations, vol. iii. p. 260.

MERIDIAN LINE, on a dial, is a right line arising from the intersection of the meridian of the place, with the plane of the dial: this is the line of twelve o'clock, and from hence the division of the hour-lines begin. See DIAL.

MERIDIAN (Magnetical), is a great circle passing through the magnetical poles, to which the magnetic needle, or needle of the mariner's compass, conforms itself.

MERIDIAN ALTITUDE OF THE SUN AND STARS, is their altitude when in the meridian of the place where they are observed. Or it may be defined, an arch of a great circle perpendicular to the horizon, and comprehended between the horizon and the sun or star then in the meridian of the place.

MERIDIANI, in antiquity, a name which the Romans gave to a kind of gladiators who entered the arena about noon after the bestiarii (who fought in the morning against beasts) had finished. They were thus called from *meridies*, i. e. noon, the time when they exhibited their shows. The meridiani were a sort of artless combatants, who fought man with man, sword in hand.

MERI'DIONAL. *a.* (*meridional*, French.) 1. Southern (*Brown*). 2. Southerly; having a southern aspect (*Wotton*).

MERIDIONAL DISTANCE, in navigation, is the same with the departure, or easting and westing, or distance between two meridians.

MERIDIONAL PARTS, MILES, OR MINUTES, in navigation, are the parts of the increased or enlarged meridian, in the Mercator's chart. Tables of these parts are in most books of navigation; and they serve both for constructing that sort of charts, and for working that kind of navigation.

The parts of the enlarged meridian increase in proportion as the cosine of the latitude to radius, or which is the same thing, as radius to the secant of the latitude; and therefore it follows, that the whole length of the enlarged nautical meridian, from the equator to any point, or latitude, will be proportional to the sum of all the secants of the several latitudes up to that point of the meridian. And on this principle was the first table of the meridional parts constructed, by the inventor of it, Mr. Edward Wright, and published in 1599, viz. he took the meridional parts

of $1' =$ the sec. of $1'$;
of $2' =$ sec. of $1'$ + sec. of $2'$;
of $3' =$ secants of 1, 2, and 3 min.
of $4' =$ secants of 1, 2, 3, and 4 min.

and so on by constant addition of the secants.

The tables of the meridional parts, so constructed, are perhaps exact enough for ordinary practice in navigation; but they would be more accurate if the meridian were divided into more or smaller parts than single minutes; and the smaller the parts, so much the greater the accuracy. But, as a continual subdivision would greatly augment the labour of calculation, other ways of computing such a table have been devised, and treated of, by Bond, Gregory, Oughtred, sir Jonas Moor, Dr. Wallis, Dr. Halley, and others. See Robertson's Navigation, vol. 2, book 8. The best of these methods was derived from this property, viz. that the meridian line in a Mercator's chart is analogous to a scale of logarithmic tangents of half the compliments of the latitudes; from which property also a method of computing the cases of Mercator's Sailing has been deduced, by Dr. Halley. Vide ut supra, also the Philos. Trans. vol. 46, p. 559.

*To find the meridional parts to any spheroid, with the same exactness as in a sphere.*—Let the semidiameter of the equator be to the distance of the centre from the focus of the generating ellipse, as $m$ to 1. Let A represent the latitude for which the meridional parts are required, $s$ the sine of the latitude, to the radius 1: find the arc B, whose sine is $\frac{s}{m}$; take the logarithmic tangent of half the complement of B, from the common tables; subtract the log. tangent from 10·0000000, or the log. tangent of 45°; multiply the remainder by the number 7915·7044679, and divide the product by $m$; then the quotient subtracted from the meridional parts in the sphere, computed in the usual manner for the latitude A, will give the meridional parts, expressed in minutes, for the same latitude in the spheroid, when it is the oblate one.

*Example.* If $mm : 1 :: 1000 : 22$, then the greatest difference of the meridional parts in the sphere and spheroid is 76·0929 minutes. In other cases it is found by multiplying the remainder above mentioned by the number 1174·078.

When the spheroid is oblong, the difference in the meridional parts between the sphere and spheroid, for the same latitude, is then determined by a circular arc. See Philos. Trans. No. 461, sect. 14. Also Maclaurin's Fluxions, art. 895. 899. And Murdoch's Mercator's Sailing, &c.

MERIDIONA'LITY. *s.* (from *meridional.*) Position in the south; aspect towards the south.

MERI'DIONALLY. *ad.* (from *meridional.*) In the direction of the meridian (*Brown*).

MERINDOL, a village of France, in the

department of the Mouths of the Rhone, whose inhabitants were massacred on account of their religion, in 1545, by virtue of an arret of the parliament of Aix. It is nine miles E. of Cavaillon.

MERINO, the name of a valuable breed of sheep, originally reared in Spain, but now raised in other countries.

The Board of Agriculture offered a premium about three years ago for the best essay on the nature, produce, origin, and extension of this breed of sheep, which was adjudged to Dr. Parry. The following abridgement of the doctor's essay, which, we doubt not, will be entertaining to our commercial readers, is extracted from the Retrospect of Arts and Manufactures.

That the importance of the question, submitted by the Board, may be more fully estimated, the doctor has devoted one chapter to the quantity and value of superfine wool imported into England from foreign countries. That the quantity may be ascertained from undoubted authority, he has availed himself of an account presented to parliament, of wool purchased in foreign countries in 1802, 1803, and 1804. In these three years were imported from Spain 16,986,644lbs. from Holland 403,400lbs. from Portugal 400,723lbs. from Gibraltar 288,274lbs. from France 252,222lbs. from Germany 122,150lbs. from America 10,567lbs. from Prussia 3,357lbs. and from Denmark 381lbs. making a total of nearly 18 millions and a half of pounds, of which nearly 15 millions and a half were imported in Spanish or neutral vessels, and the remainder in English vessels. His inquiries among the clothiers have enabled him to state the value of this quantity to be as follows:

| | lbs. | | £. |
|---|---|---|---|
| Sheep's wool, marked R (finest sort) - - - - - - - - | 12,000,000, | at 6*s.* | 3,600,000 |
| Ditto, marked F (second sort) | 2,000,000, | at 5*s.* | 500,000 |
| Ditto, marked T (third sort) | 1,127,020, | at 4*s.* 6*d.* | 253,579 |
| Ditto, marked K (fourth sort) | 14,920, | at 3*s.* | 2,238 |
| Lamb's wool - - - - - - - | 165,778, | at 4*s.* 3*d.* | 35 227 |
| In foreign vessels quantity | 15,307,718lbs. | value | 4,391.044 |
| In English vessels quantity 3,160,000lbs. value according to the same proportions, for it could not be ascertained - - - - - - - - - | | | 906,449 |

These accounts give the annual average of Spanish wool imported as exceeding 6,155,906lbs. weight, and the annual average value as upwards of 1,560,000*l.* sterling.

In the next succeeding chapter he proceeds to describe the Merino breed of sheep, which produce this valuable article of importation. Their native country is Spain: the number of them in that country is about five millions: they are divided into two sorts, those which travel from one part of the country to another, which are called Trashumantes; and those which remain always in the same pastures, named Estantes. The animal is described below the middle size, in comparison with English breeds, not very unlike the Ryeland, or old Southdown breed, and by no means furnished with that form which modern fashion has presumed to be inseparably connected with a disposition to early maturity and fatness. And though individuals differ much in these respects, yet the Merino sheep have generally their heads large and their necks long, their chests contracted, and being sharp on the shoulders, and flat-sided, and narrow across the loins. Against these defects, however, are to be adduced the peculiar quality of the skin, which is remarkably thin, soft, and loose, affording that evidence of a strong disposition to fatten, which many of our farmers call proof: the skin also differs from that of the native sheep of Britain, in being of a fairer hue, with a vivid tint of what is called carnation, or flesh colour, which tint is particularly conspicuous on those parts which are free from wool, as the eyelids and lips. With this peculiar condition of the skin, he considers to be connected the peculiar characteristic of the Merino race; namely—its fineness and flexibility; in which the Merino is superior to every other race of sheep in the world. This breed is literally buried in wool; it exists on their foreheads almost to the eyes, and on their cheeks, and entirely covers their bellies and legs. The length of the staple or filaments of wool is from two to more than three inches; the wool of the ram coarsest and longest, of the ewe finest and shortest; of the wedder, in both respects, between the two former.

It is stated from the publication of M. Lasteyrie, that the average weight of the fleece, unwashed, is about 5lbs. 7oz. English weight; but in the Compte rendu à la Classe des Sciences of Paris for 1802, 30 fleeces, recently imported, are said to have weighed, unwashed, 99 kilogrammes and a half, which is equal to 7lb. 5½oz. English, for the weight of each. This wool, however, was of thirteen months growth. Dr. Parry considers the weight, quoted from Lasteyrie, to be equal to the average of ewes' fleeces, and that it is probable the medium weight of rams' fleeces, in Spain, does not exceed seven pounds; though there is certainly great difference in the weight of particular fleeces.

The principal Merino flocks are then enumerated, both those belonging to the grandees and to the different societies of monks, which compose the corporation of the Mesta. The size of the Nigrette is stated to be superior; but it is said that the race of the Escurial is supposed to have the finest wool of all.

The difference between different flocks of Merino sheep, in Spain, and between different individuals of the same flock, is referred to the proportion of the grease, or yolk, which imbues all wool, but pre-eminently that of the Merino. From its superabundance in this particular breed, the fleece contracts, near its surface, a quantity of dust, earth, and other matters, so as to give the animal a dirty appearance; which usually is most manifest on the finest fleeces, as they contain the greatest quantity of yolk or grease; but notwithstanding this darkness on the surface, the wool when drawn asunder, nearer the skin, has a brilliant silky appearance, and, when scoured, is of the purest white.

The fleece is not washed for sale on the sheep's back, but after the wool is sorted; and usually loses three fifths of its weight in the operation, and some authors assert that the loss is often two thirds; and afterwards, in scouring by the clothier, an additional loss is sustained of about three, or three and a half, in twenty; but as the quantity of the yolk is different not only in different individuals, but in the same individual at different seasons, the loss in washing and scouring will proportionally vary.

It is remarked that the yolk of wool, here spoken of, has not escaped the notice of the French chemists: by an analysis of this substance by Vauquelin, published in the Annales de Chimie, it is found to contain a large proportion of fatty

matter united with potash, so as to form a natural soap; a smaller quantity of potash, combined partly with carbonic, partly with acetous, and partly with muriatic acid; a little lime, in a state of unknown combination; a small quantity of uncombined fatty substance; and a little animal matter which seems to produce the peculiar waxy smell: this yolk is supposed to be formed from the perspiration of the animal.

The wool of Merino sheep is also said to differ from that of all our native breeds, in being nearly of an equal fineness on the shoulder and the rump, though it grows more thickly on the latter part; and the whole fleece is remarkably free from those coarse hairs, usually styled snitchel hairs or cats' hairs; and the wool of the lambs is much coarser and harder than that of the sheep. The sheep themselves are longer in coming to maturity than most other breeds; they do not acquire their full growth till three years old, and the ewes rarely take the ram till they are eighteen or twenty months old, though the rams are fit for generation in a year: but the most striking particular in which the Merino race differs from every breed of short-woolled sheep, either in this or other countries, is, that while very few of the rams are polled, or have short snags, the majority have large spiral horns; and on the other hand, a horned Merino ewe is rarely to be found. The rams and ewes form separate flocks, in Spain, till the beginning of July, from whence they are suffered to continue together till the middle of August; one ram is generally allotted to twenty or twenty-five ewes. The ewes seldom produce more than one lamb at a birth, and seldom more than a fourth of these are permitted to be raised; the remainder are killed immediately as they are dropped, and by transferring the skin to another lamb, the mother is induced to adopt it, so that each lamb has two and sometimes three nurses. As the ewe-lambs are mostly preserved, the ram-lambs are but few, and are very rarely castrated: the wedders are rams on whom this operation has been performed at six or seven years of age, when they are no longer fit for propagation. So little are these sheep considered an article of food, that though immense flocks of them pass through or near Madrid twice every year, the mutton of that capital is supplied from Africa, as the beef and pork are from the neat cattle and pigs of France.

In the winter, the Merino flocks cover the plains of the fertile provinces of Valentia, Murcia, Arragon, Castile, La Mancha, Andalusia, Estremadura, and the neighbourhood of Cadiz; but when the herbage is wasted by the increasing heat of the sun, which generally happens in April, or the beginning of May, the flocks commence their journeys to the mountains of Leon, Castile, Navarre, Arragon, Segovia, Burgos, the Asturias, and other elevated districts. These journeys are conducted with much order, and are minutely described in the essay. During this journey the shearing takes place: when the weather is fine, the sheep are conducted to the esquileos, or shearing-houses, which are usually on the mountains near the roads; they are kept for a day previous in a sudadeos, or sweating-house, in which they are so crowded as to have scarce room to move, or even to breathe; and though this practice has for its pretended object an increased facility of shearing, yet it is probably meant to augment by perspiration the weight, and consequently the price of the fleece. One with another each man shears fifteen sheep in a day; and if by accident the skin is wounded, they drop on the part a little powdered charcoal to heal the wound and guard it against the fly. When the fleeces are shorn, they are put into a damp warehouse, all the doors and windows of which are closely shut, so as not to admit any transmission of vapour; and this warehouse is not opened till the merchant comes to weigh the fleeces. The Spanish flocks occasionally suffer much from shearing; and that of the count del Campo Alange is reported to have lost five or six thousand in a single night. The shearing lasts three or four weeks, after which the sheep proceed on their journey, and remain on the mountains till the return of winter, when they are driven back again to the plains. It is customary to give all the sheep in Spain, whether Trashumantes or Estantes, a small quantity of salt, but the former have it only when in the mountains.

The wool in sorting is divided into four parts: the first, which is called by the Spaniards refina, or floreta, and which is marked R, is taken from the flanks, the back as far as the tail, the shoulders, and sides of the neck;—the second, or fina, marked F, comprises the wool of the top of the neck, the haunches as far as the line of the belly, and the belly itself; the third, tercera, marked T, is that of the jaws, the throat, the breast, the fore-legs to the knees, and the hinder thighs from the line of the belly down to the hocks;—the fourth, or cahidas, marked K or C, is that below the hocks, between the thighs, the tail, the buttocks, the pole, and behind the ears, and all that which shakes out of the fleece in shearing or in washing. A set of bags, containing the whole of the first three sorts, is called a pile, the proportion of which many years ago was R 15 parts, F 4, and T 1; the profit arising from the sale of the cahidas, or fourth sort, is said to be allotted for the consolation of souls in purgatory. When the wool is sorted, it is reduced by washing in hot water to the state in which it is imported into this country.

Of the five millions of sheep in Spain, the Estantes, or stationary part, are said to be about one tenth; and though there is in Spain, as in England, a prepossession in favour of the effect of travelling on the fleece, which the great proprietors encourage, yet it is asserted, on the authority of Bourgoanne and Lasteyrie, that several of the stationary flocks yield wool equal in excellence to the best of the Trashumantes; in Estremadura and Segovia there are flocks which never travel, the wool of which is not inferior to that of the other sort.

The diseases to which the Merino breed is chiefly subject, in Spain, are said to be the scab, giddiness, and an eruptive infectious disorder, like the small-pox, fortunately unknown in England, and for which we have no name. The Spanish shepherds do not employ any remedies worthy of notice for the cure of these maladies, unless it be of importance to announce, that when other means fail, they have recourse to magic.

Every thing respecting the maintenance of the flocks in Spain, as well Merinos as others, is directed by a code of laws called the Mesta, which first received the sanction of government about the year 1450.

The author proceeds to state, that he has looked in vain into writers for any plausible explanation of the name Merino, or any authentic history of the origin or introduction of the race itself. By some, he observes, it is attributed to England, and sup-

posed to be derived from the Cotswold breed; but from an inquiry into the quality of English wool, cloth, and sheep, from the earliest times to the latter end of the seventeenth century, he is of opinion that the Merino breed was not derived from Britain. It is also given as the opinion of the best informed writers, in which Dr. Parry himself concurs, that they were not originally brought from Africa, though this is strongly maintained by a writer in the French Encyclopedie, who boldly asserts that this race was formed about the time of the emperor Claudius, from the importations of African rams, by Columella, uncle to the celebrated agriculturist of that name. That the encyclopedist was evidently mistaken is proved by a quotation from the seventh book of Columella's Treatise De Re Rusticâ; it appears, however, that the Roman agriculturist tried many experiments to obtain fine-woolled coloured lambs, by coupling coarse-coloured rams, which he obtained from Africa, with white fine-woolled ewes; but it does not follow from his words (*in agros transtulit*) that Columella placed those rams on any lands of his in Spain. Dr. Parry thinks it much more probable, even from the words themselves, as well as from the nature of his object, that he brought them into the Roman territories in Italy, where there was abundance of the *oves molles*, the *oves tectæ*, which were chiefly valued for fine white wool. For among the Romans all ranks of people, of both sexes, wore chiefly woollen garments, a pound of silk, even in the reign of Aurelian, at the close of the third century of the Christian era, being, according to Vopiscus, equal in value to a pound of gold. And when the pre-eminence in wealth and the prevailing vanity of the Romans are considered, and since the heat of Italy is so great at certain seasons of the year as scarcely to admit the use of a woollen dress, the doctor is of opinion, that the quality of the wool must have been a matter especially important, since, during the Augustan age, and for a considerable time afterwards, it was the fashion to wear cloth furnished with a nap or pile. It is recalled to the recollection of the reader, that Varro, Columella, Pliny, Martial, Palladius, Petronius, and Calpurnius Siculus, agree in stating that the sheep which produced the finest wool in the Roman dominions were those of Apulia and Calabria. A pound avoirdupois of this wool is stated to have cost about 1*l.* 1*s.* 7*d.* of our money. And even at this time, according to Pliny, and some other ancient authors, Spain was not without valuable breeds of sheep, which were memorable for bearing fleeces naturally of different tints. Columella speaks of them as bearing blackish or tawny coloured fleeces; Pliny, who lived somewhat after him, adds, that they were occasionally of a reddish or gold colour, like those of Asia; and Martial compares them with the golden or red hair of women. The opinion of Strabo, with respect to the Portuguese sheep, is then examined, and it is clearly made out, that the wool of them was more like hair, and incapable of being manufactured into cloth with a nap or pile. The historians of Spain, who had been diligently consulted for the purpose, afforded him no information on the subject.

From all these circumstances he concludes, that however the notion of the English origin of the Merino breed of sheep may serve to flatter the national pride, yet that it falls to the ground as soon as it is investigated; and also that it is not more probable that the race was introduced into Spain from Barbary, as asserted by the French encyclopedists: but, adverting again to the attention which the Romans paid to their sheep, and particularly to that breed, which, from producing the fine short wool, was much valued, and the object of peculiar care on that account, he thinks it probable that the race of short-woolled sheep of the ancient Romans, and the present race of Merino sheep of Spain, are the same: for the perfection of both these breeds, he observes, seems to have consisted in certain common qualities. "The favourite ewe of ancient Italy was to have a large carcarse, capacious belly, short legs; and the ram a wide breast, shoulders and buttocks, a long and deep body, and a broad and long tail. The fleece was to be thick, soft, and deep, especially about the neck and shoulders. It seems to have been with a view to the increase of wool on this finest part of the animal, that the Romans thought a long neck valuable in the ewes: the ears and forehead of the rams were to be involved in wool, and no individual of either sex was tolerated, of which the wool did not clothe the whole belly. Regard was also had to the horns: it is a memorable circumstance in these sheep, that the rams had generally horns, and the ewes none; still however the polled rams were most esteemed."—"It is impossible for any one who reads this description," says Dr. Parry, "and who is acquainted with the improved Merino race of the present day, not to suspect that they are one and the same breed."

He then proceeds to investigate evidence as to this fact: he observes, that throughout Europe, as far as he knows, there is not any short-woolled breed besides the Merinos existing, except in Italy, of which the males are horned and the females not: that in former times the sheep of Apulia and Calabria had their different summer and winter quarters, the same as the Merinos now have in Spain; it was also the universal practice among the Romans to give salt to their sheep, with a view to promote appetite and thirst, to increase milk, and to improve digestion; and he can hardly believe that this practice, which still subsists in Italy, should from time immemorial have found its way into Spain, and into that country only, except by immediate communication: and as the Spanish flocks are frequently led by goats in the present day, so it appears, from Tibullus, this was a common usage among the Romans. Dogs follow the flocks in Spain as well as in most other countries; they are however not intended, as in England, France, and most other European districts, to assist the shepherd in guiding and regulating the sheep, but are of a strong and fierce kind, serving to guard and protect both against the depredations of robbers and beasts of prey: so also dogs were kept by the Romans for the same purposes, the qualities, uses, and treatment of which are minutely described by Varro and Columella. Many of these instances, it may be said, may have been coincidences of practice, suggested by similarity of circumstances, but could not have been the reason why, in order to avoid variegated fleeces in the offspring, both nations should exclude rams with spotted mouths or tongues from the privilege of breeding; a practice which is stated to have prevailed among the Romans, upon the authority of Varro and Columella, and to be adhered to by the modern Merino shepherds, on the authority of Lasteyrie. A still more remarkable coincidence is noticed, which is the practice of killing a considerable number of lambs very shortly after they are dropped. This custom prevailed equally with the Romans as it does with

the present Spaniards, and precisely from the same motives;—that as the wool only was the valuable produce of the flock, each lamb might acquire more strength by having two nurses.

This agreement then in so many important particulars of form, fleece, constitution, and general treatment, satisfies the author of the Essay beyond all reasonable doubt, that the present Merinos are the same race as the ancient Tarentine sheep of Apulia; yet he can find no evidence of the time when they were first introduced into Spain. For though the union of Italy and Spain first took place under Frederick, king of Arragon and Sicily, about the beginning of the fourteenth century, yet it is not in Arragon that the best Merino sheep are now found; and the author conceives that the circumstances of the history of Spain would rather induce a belief that their introduction took place at a more remote period than 1300: he leans to the idea of their having existed in that country during the dominion of the rich, industrious, and luxurious Moors, if not in still earlier times, when Spain was under subjection to Rome.

Dr. Parry, having thus completed his observations on the nature, produce, and origin of the Merino breed of sheep, concludes the first part of his Essay by remarks on the extension of the race to various parts of the world.

The Swedes are stated to be the first nation in Europe, who imported Merino sheep with a view to naturalize them; though the most northern part of this country is burnt up during a short summer by a sun which never sets for many days, and the whole is desolated by a winter of seven or eight months, during which the ground is covered with uninterrupted snow. Notwithstanding this it is stated, that M. Alstroemer introduced a flock of Merino sheep into Sweden in 1723, and that under his direction the government instituted a school of shepherds in 1739, and granted bounties of 25 per cent. to the sellers of fine and good wool; these, however, were reduced to 15 per cent. in 1781, to 12 per cent. in 1786, and in 1792 where wholly discontinued. The Merino sheep now in Sweden are estimated at 100,000, or about one twenty-fifth part of the sheep of the country, and the wool is in every respect equal to that of Spain; the size of the animal has in many cases degenerated, but the wool produce has proportionally increased; and the Swedes raise at present in their own country nearly as much fine wool as is sufficient for their manufactures. The more attentive cultivators lodge their sheep during the whole year in large airy buildings, the windows of which are always open, and the doors made of hurdles, and they are driven out twice in the day; the daily allowance of food given to each is two English pounds of hay, with an addition of dried leaves of trees, stalks of the hop, pease-haulm, and oat and barley straw; but many only house them at night for security against the wolf and the lynx. The sheep are allowed salt in damp or rainy weather; and the shearing takes place in July, the sheep having been previously washed: the average weight of well-washed ewes' fleeces is given at full three pounds, and of lambs' fleeces at one pound.

The Danes first carried Merino sheep from Sweden in 1789, a few descendants of which remain; and in 1797 the government of Denmark imported 300 sheep from Spain, from the celebrated breeds of the Escurial, Gaudaloupe, Paular, Infantado, Montano, and Negrette: these were placed at Esserum, eight leages from Copenhagen, and were all alive, except two, eighteen months afterwards, when they were seen by M. Lasteyrie. They are kept in airy houses, and fed with hay, or rye and oat straw cut into chaff; they are fed three times a day with an allowance in the whole of 3¼ pounds of dry food, and in warm weather are sent out into enclosed pastures without a shepherd: salt is given them in wet weather, and some persons give them the heads of salt herrings, or the brine which has been used for pickling meat or fish; the lambs are weaned at three months, and are then allowed the best pastures.

Augustus Frederick, elector of Saxony, introduced Merino sheep into his dominions in 1765: the number was three hundred, divided into four establishments; and at the end of ten years they were found to have had all possible success; the sheep of the pure blood preserving every valuable quality, and the ultimate crosses having wool fully equal to the pure Merinos. The winter food of this race in Saxony consists of hay, lattermath, clover, oat or rye straw, pease-haulm, vetches, &c. which are given twice or thrice in the day in large buildings, but in summer the sheep are only housed at night, and kept from the pastures till the dew is dissipated. Salt is very generally distributed to them by the Saxons, from an idea that it contributes to their health and to the fineness of their fleeces. The lambs fall before March, and are weaned in June; the sheep are washed before shearing in running water two successive days, suffered to dry for two days, and are shorn on the third, which generally takes place in May. Saxony no longer imports Spanish wool; and much of that grown there has been sent for some years to the fairs at Leipsic, and part of it imported into England. It is said to be allowed by manufacturers, who have tried this wool, that it makes cloth superior in softness and fineness to any obtained from the best Spanish piles.

The Merino breed of sheep was first introduced into Prussia by M. Finck in 1768, who obtained his original stock from Saxony; but in 1779 he imported three rams and twenty ewes directly from Spain. Though he has carefully maintained the pure race, yet he has chiefly employed his rams in improving the native breeds. The count de Magnis also possesses, at Eckersdorff in Silesia, a flock of nine thousand sheep by the Merino cross. His attention has been directed to uniting size with fineness of wool; he has therefore mixed the best Merino rams with the large breed of Hungary, and in this respect has made great progress, one sheep with another giving three pounds of washed wool, on a carcase larger, stronger, and better formed than any other fine-woolled sheep on the Continent. The times of yeaning, and the treatment of these flocks in Prussia and Silesia, are so nearly the same as what prevails in Saxony, as not to deserve a separate notice: most of the farmers in Prussia allow their sheep to go out during the day in the severest weather, and give them dry food during the night. The count de Magnis gives his sheep corn, but considers it as too expensive; he regards potatoes as equally beneficial with oats, and certainly much cheaper; and during the winter his sheep eat as much salt as they choose.

The war with Austria prevented M. Lasteyrie from visiting that country and some other parts

of Germany; the information therefore which Dr. Parry is able to give, concerning their Spanish flocks, is very limited and imperfect. He relates however, from Lasteyrie, that the empress queen Maria-Theresa imported Merino sheep from Spain in 1775, and placed them at Mercopoil in Hungary; and that subsequently to that period two other flocks have been brought from Alicant to Trieste: and in 1802 a person was employed by the emperor to purchase sheep in Spain. In Anspach and Bayreuth attempts are noticed to improve the native sheep by the introduction of Merinos; and in Mecklenburgh, Zell, Brunswick, Baden, and Hanover, this race has been long enough introduced to improve the wool of those countries in a considerable degree.

It is remarked, that few countries appear less adapted to the support of sheep than the rich and marshy soil of Holland; yet in 1789 M. Trent imported from Spain two rams and four ewes, and placed them on an estate between Leyden and the Hague; in 1793 he imported three new rams and four ewes; and in 1802 his flock amounted to one hundred. His rams' fleeces weighed from 10 to 14 pounds, and his ewes' fleeces from 6 to 10 pounds, in an unwashed state. To prove the fineness of his wool, he placed on a piece of black cloth nine specimens of his own wool by the side of the best specimens of superfine Spanish which he could procure, and sent them to a clothier, who pronounced five of M. Trent's specimens to be superior to the superfine Spanish. In 1793 M. Cuperus, near Leyden, also imported some Merinos from Spain into Holland, and his crosses of the native breeds were in 1802 nearly equal to the unmixed Spaniards in fineness of fleece.

Piedmont appears to Dr. Parry to have first obtained the Spanish breed of sheep in 1793, when prince Masserino chose 150 ewes from the best flocks of Segovia. Notwithstanding the war which existed at the time, they increased considerably, and many crosses were obtained from the ewes of Germany, Rome, Naples, and Padua. The greater part of the proprietors agreed to form a society, and in 1801 obtained from the government of France, to which Piedmont was then annexed, a grant to improve, under certain conditions, the plains of La Mandria: the laws for the regulation of the flocks of this society are given by M. Lasteyrie. The management of the Merino flocks of Piedmont appears to vary but in few particulars from the modes which have been previously described. The cultivators of the plains of La Mandria drive their flocks to the Alps from the middle of June to the end of October; they are seldom folded except in the mountains, experience having shewn that their dung in the house is more profitable, provided they are supplied with a proper quantity of straw.

"There is, however," says Dr. Parry, "no country in Europe which of late years has taken so much laudable pains in cultivating the Merino breed of sheep as France." For though it appears that Spanish sheep had been imported into France at an early period, yet the first person who paid any systematic attention to the wools of that country, by this method, is said to have been Daubenton, who in 1776 obtained part of 200 Merinos imported by M. Trudaine, intendant of the finances. The flock of Daubenton is now in the possession of M. Thevenin of Tanlay, and produces wool of the very first quality. In 1786 about 400 Merino sheep were presented by the king of Spain to Louis XVI. but 60 of them died on their journey, and a greater number fell a sacrifice to the febrile disease before mentioned, similar to the small-pox, after their arrival at Rambouillet. This royal present, having been chosen for their form and fleece from various Spanish flocks, differed much both in size and shape; but having been better assorted after their arrival in France, produced a race unlike any of the original breeds, but equal to the best of them in mould and fineness of wool, and superior in weight of carcase and of fleece. A particular account is given of this flock, which was placed under the direction of an agricultural committee at the commencement of the French revolution, who made an annual report to the National Institute on the subject. From the report of the year 1802 it is stated, on the authority of Lasteyrie, that the medium weight of the fleeces of full-grown nursing ewes was about 8lb. 7oz.; of the ewes of three years old, which had no lambs, about 9lb. 13oz.; of the two-tooth ewes about $10\frac{1}{2}$lb.; and of the rams of three or four years old about 11lb. $5\frac{1}{4}$oz.: each fleece selling on an average at the price of about 1l. 3s. 4d. sterling. Dr. Parry has seen several specimens of the Rambouillet wool of 1802, and indeed is in possession of some of it; and, as far as he can judge of their quality by the naked eye, he considers them to be equal to the Ryeland wool of the Spanish piles. It is stated that, by a secret article in the treaty of Basil, the French Directory had stipulated for itself the privilege of purchasing in Spain 1000 ewes and 100 rams in each of the five succeeding years. From the Rambouillet flock many others have been established in France and its dependencies, none of which is said to be more justly entitled to general notice than that of M. C. Pictet, of Geneva, who established a Merino flock in 1800; and besides these pure Spanish flocks, there are many others of a mixed breed, which have originated from experiments made by individuals, the result of which is said to be, that, with due care, the wool in every breed of sheep is capable of arriving at a degree of fineness equal to that of the Merino, and that the effect is produced by constantly crossing with the finest woolled rams, and is generally obtained sooner or later according to the fineness of the fleece of the ewe, but in no breed later than the fourth cross.

From the account which he has given, it appears to the author of the Essay that the Spanish breed of sheep has been much improved in weight, and probably fineness of fleece, and has considerably increased in size, by having been naturalized in France; and he thinks these valuable points have been accomplished in the four following ways: 1. By choosing for breeding the finest and best woolled rams and ewes;—2. By never allowing them to propagate till they have attained their full growth, which, at the earliest, is not till nearly three years of age;—3. By separating the weak from the strong;—4. By giving them good food, and plenty of air and exercise. A particular account of the mode of feeding and treating them is subjoined in illustration of this opinion, which is too extended to be comprised in this analysis.

It is next remarked, on the authority of count Alexis Orloff, that Merino sheep have been imported into Russia, but no information is given of the result. With respect to this breed at the

Cape of Good Hope, some particulars are communicated from the information of sir George Yonge, who was governor there; and the author having once had a ram of the native Cape breed, speaks from his own knowledge that the wool chiefly consists of long coarse filaments like hair; this has been very much improved by a cross of Merino rams; and Dr. Parry speaks of a specimen of wool from the fourth cross of the native Cape sheep, which he had obtained from sir George Yonge since his return to England, as having a filament so fine, that the next cross would produce wool fully equal to good Spanish.

From these Cape Merinos sprung a race of sheep, which were carried from thence in 1797, by captain M'Arthur, to the English settlement on the coast of New Holland; and a memorial presented by that gentleman to the English government in 1783 is added, to evince his sanguine expectations that wool might be produced there from the Merinos, which would be superior to Spanish wool; and some samples which he brought over and gave to Mr. Joyce, of Freshford, near Bath, were equal in fineness to any he had ever manufactured.

Though it is admitted that Merino sheep have been at various times imported into Great Britain, yet the plausible tales of the French encyclopedists on this point are shewn to have no foundation in truth; and the sheep of this breed, which have been imported in modern times, are believed to be very few, till the king obtained some Merino sheep in 1792; in which year he purchased five rams and thirty-five ewes from the flock of the countess del Campo Alange, which is called Negrette. The management and distribution of this flock through the country by periodical sales are then amply detailed; but these are circumstances too generally known to make their insertion necessary in this place. The most ample information of the progress of the royal Merino flock of England may be obtained from the Reports of sir Joseph Banks, under whose care the flock is placed, and through whose judicious management, it is asserted, the farm has been considerably improved, and the fleece rendered finer than the Negrette pile, the wool of the parent stock in Spain.

The exertions of lord Somerville to introduce Merino sheep are next noticed, with appropriate commendations of his judgment and zealous activity in all agricultural pursuits; and he is said to have treated his flock so successfully, that the cloth manufactured from his wool is superior to the greater part of that manufactured from Spanish, and the carcase at the same time is fast approaching to best Ryelands or South-downs. The Merino flocks of lord Portchester and Mr. Tollet, which have been formed from those of the king and lord Somerville, are also mentioned; and it is added, that, besides these larger flocks, there are in the kingdom many smaller ones of Merino sheep which the author cannot particularize; but it appears to him that the principal mode in which the utility of the Merino race has been extended in England, has been by crossing our native breeds with Merino rams. The cross with Ryeland ewes is supposed to be that most frequently resorted to, and several gentlemen are named, who were zealously employed in promoting the cross with the Ryeland, the South-down, and the Wiltshire breeds.

MERIONETHSHIRE, a county of North Wales, 36 miles long and 34 broad; bounded on the N. by Carnarvonshire and Denbighshire, on the E. by the latter county and that of Montgomery, on the S. by Cardiganshire, and on the W. by the Irish sea. The face of this county is varied throughout with a romantic mixture of all the peculiar scenery belonging to a wild and mountainous region. The principal rivers are the Dee and Dovy; and it has a great mountain, the Cader Idris, one of the highest in Wales. Merionethshire contains six hundreds, four market-towns, 37 parishes, and sends one member to parliament. Harlech is the capital.

ME'RIT. s. (*meritum*, Latin; *merite*, Fr.) 1. Desert; excellence deserving honour or reward (*Dryden*). 2. Reward deserved (*Prior*). 3. Claim; right (*Dryden*).

*To* ME'RIT. *v. a.* (*meriter*, French.) 1. To deserve; to have a right to claim any thing as deserved (*South*). 2. To deserve; to earn (*Shakspeare*).

MERITO'RIOUS. *a.* (*meritoire*, French.) Deserving of reward; high in desert (*Sanderson.*)

MERITO'RIOUSLY. *ad.* In such a manner as to deserve reward (*Wotton*).

MERITO'RIOUSNESS. *s.* (from *meritorious.*) The act or state of deserving well (*South*).

ME'RITOT. *s.* A kind of play (*Ainsworth*).

MERLIN (Ambrose), a famous English poet and reputed prophet, flourished at the end of the 5th century. Many surprising and ridiculous things are related of him. Several English authors have represented him as the son of an incubus, and as transporting from Ireland to England the great stones which form Stonehenge on Salisbury plain. Extravagant prophecies and other works are also attributed to him, on which some authors have written commentaries.

MERLIN, in ornithology. See FALCO.

MERLON, in fortification, is that part of a parapet which is terminated by two embrasures of a battery. See FORTIFICATION.

MERLUCIUS, in ichthyology. See GADUS.

MERMAID, or MERMAN, a fabulous sea-creature, frequently talked of, supposed half human and half fish.

MERNS. See KINCARDINESHIRE.

MEROCELE. (*merocele*, μηροκηλη; from μηρος, the thigh, and κηλη, a tumour). A femoral hernia. See HERNIA.

MEROE, an island of Ethiopia, with a town of the same name. Its original name was Saba, and Cambyses gave it that of Meroe from his sister. Encompassed by watery boundaries so interesting in history, Meroe was celebrated for its profusion of precious metals, and of gems still more precious. It abounded beyond all countries in ebony; and with this valuable wood it abounds to the present day. In the flourishing age of the Ethiopians, it is said to have been defended by upwards of two hundred thousand soldiers, and enriched by double that number of industrious artizans. But the circumstance especially deserving regard is, that

it remained a theocracy, or sacerdotal government, down to the learned age of Ptolemy Philadelphus, when king Ergamenes of Meroe, who had imbibed enough of Greek philosophy to liberate him from cowardly superstition, but too little to teach him either humanity or good policy, massacred the collective body of priests, ministers of the golden temple, who had long and wisely governed both prince and people. Having committed this enormity, the usurper coerced by the arm of power a nation that had been immemorially governed by the mere force of opinion. Before a melancholy revolution, eternally fatal to the prosperity of Meroe, that island might be considered as the subsisting model of a government, anciently very prevalent, and which, without arms, and with few corporal punishments, overawed the minds of men, and concentrated their exertions, taught them to rear temples, and form sacred enclosures, haunts indeed of superstition, but seats also of industry and commerce, and which, by the labours of peace, adorned many parts of the ancient continent with great cities, before the iron age of conquerors and destroyers.

MEROPE. The most remarkable of this name is one of the Atlantides, who married Silphus, son of Æolus, and, like her sisters, was changed into a constellation after death. [See PLEIADES.] It is said, that in the constellation of the Pleiades, the star of Merope appears more dim and obscure than the rest, because she, as the poets observe, married a mortal, while her sisters married some of the gods, or their descendants.

MEROPS, a king of the island of Cos, who married Clymene, one of the Oceanides. He was changed into an eagle, and placed among the constellations.—2. A celebrated soothsayer of Percosus in Troas, who foretold the death of his sons Adrastus and Amphius, who were engaged in the Trojan war. They slighted their father's advice, and were killed by Diomedes.

MEROPS. Bee-eater. In zoology, a genus of the class aves, order picæ. Bill curved, quadrangular, compressed, carinate, pointed; nostrils small, at the base of the bill; tongue slender, the tip (generally) jagged; feet gressorial. Twenty-six species: one only, the common bee-eater, found in our own country; the rest scattered over India, Africa, and the south of Europe.

M. apiaster, or common bee-eater, is chiefly worth describing. Independently of England, it is found in other parts of Europe, in Asia, Africa, and America. It derives its name from the food on which it chiefly subsists, such as bees, wasps, and other large insects, which, like the swallow, it catches while they fly. In the island of Candia, the boys take it by baiting a hook fastened to a string, with an insect; which, as soon as perceived, it greedily swallows, together with the hook, and is thus secured like a fish in the water. When insects fail, the bee-eater can subsist on grain; for the trituration of which, he swallows small stones, like all other granivorous birds. Bee-eaters, though extremely numerous in Candia, are not frequently seen in Greece or Italy. Willoughby mentions, indeed, that he saw some exposed to sale in the markets of Rome. They are frequently observed in the south of France, where they are seen alighting on the fruit-trees, while in blossom, watching the bees and wasps that come to feed upon them. They traverse as far north as Sweden, and are spread in the temperate zone, from Judea to Bengal.

The bee-eater, like the bank-swallow and king-fisher, nestles in the bottom of holes dug with its strong claws; and sometimes in the sandy banks of large rivers, where it frequently digs to the depth of five feet below the surface. These birds are celebrated by Aristotle, Pliny, and Ælian, for their parental affection. They allege, that they are no sooner able to fly, than they consecrate their labours to the service of their parents, supply them with food, and anticipate all their wants. This, however, is merely a fable, which appears to have been often copied, for the sake of the moral. The head and neck of the common species are chesnut, of which the latter always grows brighter as it approaches the back. The upper part of the body is pale yellow, with reflections of green and chesnut, more or less visible, according to the point from which it is viewed. The lower parts are azure, brightening towards the tail. The bill is quadrangular, a little bent, and sharp at the point. Of the toes, three are forward, and one backward; and of the three that are forward, the middle one is connected to the rest as far as the third joint.

There is, however, a second variety in which the toes are not connected so far as the third joint, and possessing a convex instead of a carinate bill. The bird is gregarious, and lays from five to seven white eggs, ten inches long.

The other species do not essentially differ in their manners so far as these have been observed. One of the handsomest is M. viridis, or Indian bee-eater, of a green colour, with a black belt on the breast, and the throat and tail of the same hue. It inhabits Bengal; and offers several varieties.

MEROS, a mountain of India sacred to Jupiter. It is called by Pliny Nysa. Bacchus was educated upon it, whence arose the fable that Bacchus was confined in the thigh (μηρος) of his father.

ME'RRILY. *ad.* (from *merry.*) Gayly; airily; cheerfully; with mirth (*Granville*).

ME'RRIMAKE. *s.* (*merry* and *make.*) A festival; a meeting for mirth (*Spenser*).

*To* ME'RRIMAKE. *v. n.* To feast; to be jovial (*Gay*).

ME'RRIMENT. *s.* (from *merry.*) Mirth; gayety; cheerfulness; laughter (*Hooker*).

ME'RRINESS. *s.* (from *merry.*) Mirth; merry disposition (*Shakspeare*).

ME'RRY. *a.* 1. Laughing; loudly cheerful; gay of heart. 2. Causing laughter (*Shakspeare*). 3. Prosperous (*Dryden*). 4. *To make* MERRY. To junket; to be jovial (*L'Estrange*).

MERRY-ANDREW. *s.* A buffoon; a zany; a jack-pudding (*L'Estrange*).

Merry-thought. *s.* (*merry* and *thought.*) A forked bone on the body of fowls (*Echard*).

MERSE. See Berwickshire.

MERSENNE (Marin), in Latin *Mersennus*, a learned French author, born at Oyse, in the province of Maine, anno 1588. He studied at La Fleche at the same time with Des Cartes, with whom he contracted a strict friendship, which lasted till death. He afterwards went to Paris, and studied at the Sorbonne; and in 1611 entered himself among the minims. He became well skilled in Hebrew, philosophy, and mathematics. He was of a tranquil, sincere, and engaging temper; and was universally esteemed by persons illustrious for their birth, their dignity, and their learning. He taught philosophy and divinity in the convent of Nevers, and at length became superior of that convent; but, being willing to apply himself to study with more freedom, he resigned all the posts he enjoyed in his order, and travelled into Germany, Italy, and the Netherlands. He wrote a great number of excellent works; the principal of which are, 1. Questiones celeberrimæ in Genesim. 2. Harmonicorum libri. 3. De sonorum natura, causis, & effectibus. 4. Cogitata physico-mathematica. 5. La verité des Sciences. 6. Les questions inouies. He died at Paris in 1648. He had the reputation of being one of the best men of his age. No person was more curious in penetrating into the secrets of nature, and carrying all the arts and sciences to their utmost perfection. He was in a manner the centre of all the men of learning, by the mutual correspondence which he managed between them. He omitted no means to engage them to publish their works; and the world is obliged to him for several excellent discoveries, which, had it not been for him, would perhaps have been lost.

MERSEY, a river that runs through the counties of Lancaster, York, and Chester, and empties itself into the Irish sea at Liverpool. By the late inland navigation it has communication with the rivers Dee, Ribble, Ouse, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Lancaster, Westmoreland, Chester, Stafford, Warwick, Leicester, Oxford, Worcester, &c.

Mersey-island, an island of Essex, at the mouth of the Coln, south of Colchester. It was seized by the Danes in the reign of king Alfred, for their winter quarters. It had eight parishes, now reduced to two, viz. East and West Mersey. The island had a blockhouse; and in the Dutch war the parliament put 1000 men in it.

ME'RSION. *s.* (*mersio*, Latin.) The act of sinking, or thrusting over head (*Ainsworth*).

MERSPURG, a town of Suabia, in the bishopric of Constance, and the bishop's usual place of residence. It is seated on the N. side of the lake of Constance, 11 miles from the town of that name. Lon. 9. 26 E. Lat. 47. 45 N.

MERTHYR TYDVILL, a village in Wales, not far from Neath, which less than 20 years ago was an insignificant place; but has since by its noble iron works become one of the most remarkable spots in that principality. These works, which are known under four different names, Cyfartha, Pennydarran, Dowley, and Plymouth works, and which belong to as many proprietors or companies, are all situated within the compass of three English miles in length and two in breadth. Within this narrow circuit there are 13 iron forges; which upon an average produce 40 tons of pig-iron per week, and 20,000 tons annually of bar and hoop iron. About 4000 workmen are regularly employed at these works.

MERTOLA, a strong town of Portugal, in Alentejo, seated near the Guadiano, 60 miles S. of Evora, and 100 S.E. of Lisbon. Lon. 7. 40 W. Lat. 37. 30 N.

MERTON, a village of England, in the county of Surry, on the river Wandle; where was once a celebrated abbey, anciently famous for the death of Kinulphus, king of the West Saxons, killed here by Kinehard Clito, in the small hut of an insignificant harlot, of whom he was violently enamoured. Kinehard himself was afterwards slain by the friends of Kinulph; and thus suffered the instant punishment of his treachery. At present this place shows only the ruins of a monastery, founded by Henry I. at the instigation of Gilbert, sheriff of Surry, and famous for the parliament held at it under Henry III. the day after his coronation, in which were enacted the provisions of Merton, which are the most ancient body of laws, after Magna Charta, and consist of eleven articles. In this assembly, upon a motion of the bishops for establishing a constitution of the canon law, by which marriage could legitimate issue previously born, the lay lords made that celebrated answer, *Nolumus leges Angliæ mutari.* Walter de Merton (probably a native of this place) bishop of Rochester, and chancellor of England, had begun his college, on his manor of Maldon, here, in 1274, but ten years afterwards removed it to Oxford, and died about four years after. It is now become considerable for its calico-printing and bleaching: four miles E. Kingston, and nine S. London.

MERULA (George), an Italian of extraordinary parts and learning, born at Alexandria in the duchy of Milan, about the year 1420. He taught youth at Venice and Milan for 40 years, and laboured abundantly in restoring and correcting ancient authors. He wrote, and addressed to Lewis Sforza, *Antiquitates Vicecomitum*; or The Actions of the Dukes of Milan, in 10 books; with some other things in the same way. His death, in 1494, is said not to have grieved any body, as he lived in a state of war with, and abused, almost all his cotemporary scholars.

Merula (Paul), born at Dort in Holland, a famous lawyer, historian, and linguist, was professor of history in the university of Leyden after Lipsius. He wrote, 1. Commentaries on

Ennius; 2. The Life of Erasmus and Junius; 3. A cosmography; 4. A treatise of law; and died in 1607.

MERULA, or BLACKBIRD, in ornithology. See TURDUS.

MERULIUS, in botany, a genus of the class cryptogamia, order fungi. Fungus with veins underneath. Twenty species; of which eleven are indigenous to our own country: of these some are stemless, some possessed of stems.

MES-AIR, in the manage, half a TERRA A TERRA and half a CORVET. See those articles.

MESARAIC VESSELS, in the general sense, are the same with mesenteric. In common use, however, mesaraic is more frequently applied to the veins, and mesenteric to the arteries, of the mesentery.

MESAULICI. (Greek.) Interpipings. The name applied by the ancients (as supposed by Meibomius) to the interacts, or pieces performed between the divisions of their drama.

MESCOLOMENTO, or MISTIO. A term used by the ancient Greeks, signifying that branch of the *melopœia,* which gave the rules for so arranging the sounds of a melody, that the voice or instrument might be kept within a certain compass: and that the three genera might be so disposed that the air should never move out of the system in which it begun, unless with some particular design.

MESE. A term applied by the ancient Greeks to the sound that completed their second tetrachord, and which was the centre of their whole system. The Mese was an octave above the *proslambanomenos,* or lowest sound, and answered in some respects to the key-note in modern music. It was also the name given to the central string of the lyre.

MESE'EMS. *impersonal verb.* I think; it appears to me (*Sidney*).

MESEMBRYANTHEMUM. Ice-plant; Fig marigold; Egyptian kali. In botany, a genus of the class icosandria, order pentagynia. Calyx five-cleft; petals numerous, linear, slightly united at the base; capsule fleshy, inferior, many seeded. Eighty-six species: one a native of Egypt; two or three of Australasia; the rest of the Cape. They may be thus subdivided.

A. without stem.

B. with a very short stem.

C. with a stem and flat leaves or none.

D. with a stem; leaves convex underneath.

E. with a stem; leaves cylindric.

F. with a stem; leaves three-sided.

Of this extensive tribe the following are the chief. 1. Mesembryanthemum, with taper, obtuse, hairy leaves, placed alternately, called the Egyptian kali. 2. Mesembryanthemum, with oval, obtuse, waved leaves, placed alternately, commonly called the diamond ficoides, diamond plant, or ice plant. 3. Mesembryanthemum, with half-taper leaves, and flowers fitting close to the wings of the stalks. 4. Mesembryanthemum, with half-cylindrical leaves, and quadrifid flowers. 5. Mesembryanthemum, with awl-shaped, three-cornered leaves, an erect stalk, and a corymbus of flowers at the triple division of the stalk. 6. Mesembryanthemum, without a stalk, with half-taper leaves, which joins at the base, and flowers with eight styles. 7. Mesembryanthemum, with plain, spear-shaped, crenulated leaves. 8. Mesembryanthemum, without a stalk, with narrow, three-cornered leaves, marked with three indentures at their points. 9. Mesembryanthemum, having stalks, and three-cornered, indented leaves, which are shaped like the Greek delta. 10. Mesembryanthemum, with the points of the leaves bearded. 11. Mesembryanthemum, with a prickly stalk, and deflexed, cylindrical leaves. 12. Mesembryanthemum, with the stalks and leaves garnished with downy hair. 13. Mesembryanthemum, with awl-shaped leaves, which are every where rough on their under-side. 14. Mesembryanthemum, with the joints of the stalks terminated by acute, pointed leaves, which are indented on their under-side, commonly called buckshorn ficoides. 15. Mesembryanthemum, with branching spines. 16. Mesembryanthemum, with awl-shaped, prickly leaves, and a headed root. 17. Mesembryanthemum, with awl-shaped, half taper, smooth leaves, which are longer between the joints. 18. Mesembryanthemum, with awl-shaped, cylindrical leaves, having distinct, dark-coloured pimples. 19. Mesembryanthemum, with a creeping stalk, which is half cylindrical, and with half-cylindrical, smooth leaves, joining at their base, and their points three-cornered. 20. Mesembryanthemum, with distinct, smooth, falchion-shaped leaves, and taper branches. 21. Mesembryanthemum, with falchion-shaped leaves, connected at their base, with the keel-shaped angle rough, and with angulated branches. 22. Mesembryanthemum, with rough, three-cornered leaves, and petals to the flower, which are of two colours. 23. Mesembryanthemum, with awl-shaped, three-cornered leaves, and with the keel-shaped angle, sawed on the outside. 24. Mesembryanthemum, with awl-shaped, cylindrical leaves, which are pimply and distinct, and a rough stalk. 25. Mesembryanthemum, with linear, obsolete, three-cornered leaves, which are distinct and smooth, and imbricated at the top. 26. Mesembryanthemum, without a stalk, with half-cylindrical leaves, which have tubercles on their outsides, and are joined together. 27. Mesembryanthemum, with acute, cylindrical leaves, connected together at their base, bowed and smooth. 28. Mesembryanthemum, with awl-shaped, three-cornered leaves, marked with obsolete, pellucid punctures. 29. Stalky Mesembryanthemum, with awl-shaped, semi-cylindrical, recurved, long leaves, which are connected at their base. 30. Mesembryanthemum, with plain, oval, acuminated, entire leaves, which are placed opposite, and connected together at their base. 31. Mesembryanthemum, with a short stalk, and leaves having hairy indentures, commonly called dog's chap ficoides. 32. Mesembryanthemum, with axe-shaped leaves. 33. Mesembryanthemum, with disarmed leaves. 34. Mesembryanthemum, without a stalk, with

tongue-shaped leaves, the borders of which are thicker on one side. 35. Mesembryanthemum, with alternate, awl-shaped, three-cornered, very long leaves.

*Culture.*—These species are all of them natives of Africa, and have beautiful flowers, which appear at different seasons of the year, some of them flowering early in the spring, others in summer, some in the autumn, and some even in winter. The first and second species are annual plants; the first grows naturally in Egypt, and does not perfect seeds in this country; the second sort is a native of the Cape of Good Hope, and is propagated for the singularity of its leaves and stalks, which are closely covered all over, with a multiplicity of pellucid gems or pimples, full of moisture, which, when the sun shines on them, reflect the light, and appear like small bubbles of ice, or a bed of diamonds, whence the names of ice-plant and diamond-plant. This species is best propagated by seeds, which must be sown on a hot-bed early in the spring; when the plants appear, they should be removed to a fresh hot-bed to quicken their growth; and when large enough, must be transplanted into separate pots filled with light fresh earth, which should be plunged into a tan-bed. About the end of June some of the plants may be inured to the open air, and afterwards turned out of their pots and planted in warm borders.

All the other species are perennials, and easily propagated by cuttings; but require care and moderate warmth.

MESENTERIC. Meseraic. Belonging to the mesentery. See MESENTERY.

MESENTERIC ARTERIES. Two branches of the aorta in the abdomen are so called. The superior mesenteric is the second branch; it is distributed upon the mesentery, and gives off the superior or right colic artery. The inferior mesenteric is the fifth branch of the aorta; it sends off the internal hæmorrhoidal.

MESENTERIC GLANDS. These are conglobate, and are situated here and there in the cellular membrane of the mesentery. The chyle from the intestines passes through these glands to the thoracic duct.

MESENTERIC PLEXUS OF NERVES. The superior, middle, and lower mesenteric plexuses of nerves are formed by the branches of the great intercostal nerves.

MESENTERIC VEINS. They all run into one trunk, that evacuates its blood into the vena portæ. See VENA PORTÆ.

MESENTERITIS. (*mesenteritis*, μεσεντεριτις. from μεσεντεριον, the mesentery.) An inflammation of the mesentery. A species of peritonitis of Cullen.

MESENTERY. (*mesenterium*, μεσεντεριον; from μεσος, the middle, and εντερον, an intestine.) The membranaceous viscus in the cavity of the abdomen, attached to the vertebræ of the loins, and to which the intestines adhere. It is formed of a duplicature of the peritonæum, and contains within it, adipose membrane, lacteals, lymphatics, lacteal glands, mesenteric arteries, veins, and nerves. Its use is to sustain the intestines in such a manner that they possess both mobility and firmness; to support and conduct with safety the blood-vessels, lacteals, and nerves; to fix the glands, and give an external coat to the intestines.

MESERAIC. See MESARAIC.

MESH. *s.* (*maesche*, Dutch.) The interstice of a net; the space between the threads of a net (*Blackmore*).

*To* MESH. *v. a.* (from the noun.) To catch in a net; to ensnare (*Drayton*).

ME'SHY. *a.* (from *mesh.*) Reticulated; of network (*Carew*).

ME'SLIN. (from *miscellane.*) Mixed corn: as, wheat and rye (*Hooker*).

MESN, or MESNE, a term in law, signifying him who is lord of a manor, and so hath tenants holding of him; yet he himself holds of a superior lord. The word is properly derived from *maisne, quasi minor natu*; because his tenure is derived from another, from whom he holds.

MESN also denotes a writ, which lieth where there is lord mesn and tenant; and the tenant is distrained for services due from the mesn to the superior lord.

MESOCOLON. (*mesocolon*, μεσοκωλον; from μεσος, the middle, and κωλον, the colon.) In anatomy, the portion of the mesentery to which the colon is attached. The mesentery and mesocolon are the most important of all the productions of the peritonæum. In the pelvis, the peritonæum spreads itself shortly before the rectum. But where that intestine becomes loose, and forms the semilunar curve, the peritonæum there rises considerably from the middle iliac vessels, and region of the psoas muscle, double, and with a figure adapted for receiving the hollow colon. But above, on the left side, the colon is connected with almost no intermediate loose production to the peritonæum, spread upon the psoas muscle, as high as the spleen, where this part of the peritonæum, which gave a coat to the colon, being extended under the spleen, receives and sustains that viscus in a hollow superior recess.

Afterwards the peritonæum, from the left kidney, from the interval between the kidneys, from the large vessels, and from the right kidney, emerges forwards under the pancreas, and forms the broad and sufficiently long continuous production, called the transverse mesocolon, which like a partition divides the upper part of the abdomen, containing the stomach, liver, spleen, and pancreas, from the lower part. The lower plate of this transverse production is continued singly from the right mesocolon to the left, and serves as an external coat to a pretty large portion of the liver, and descending part of the duodenum. But the upper plate, less simple in the course, departs from the lumbar peritonæum at the kidney, and region of the vena cava, farther to the right than the duodenum, to which it gives an external membrane, not quite to the valve of the pylorus; and beyond this intestine, and beyond the colon, it is joined with the lower plate, so that a large part of the duodenum lies within


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the cavity of the mesocolon. Afterwards, in the region of the liver, the mesocolon is inflected, and descending over the kidney of the same side, much shorter, it includes the right of the colon, as far as the intestinum cæcum, which rests upon the iliac muscle and the appendix, which is provided with a peculiar long curved mesentery. There the mesocolon terminates, almost at the bifurcation of the aorta.

The whole of the mesocolon and of the mesentery is hollow, so that the air may be forced in between its two laminæ, in such a manner as to expand them into a bag. At the place where it sustains the colon, and also from part of the intestinum rectum, the mesocolon, continuous with the outer membrane of the intestine, forms itself into small slender bags resembling the omentum, for the most part in pairs, with their loose extremities thicker and bifid, and capable of admitting air blown in between the plates of the mesocolon.

MESOIDES. (Greek.) The name by which the ancients distinguished a kind of melopœia, the sounds of which were chiefly confined to the middle chords: which chords were also called the mesoides of the mesis, or tetrachord meson.

MESOLOGARITHMS, according to Kepler, are the logarithms of the co-sines and co-tangents; the former of which were called by baron Napier anti-logarithms, and the latter differentials.

MESON. The genitive plural of *mesis*, the middle. A term applied by the ancient Greeks to the second of their tetrachords (reckoning from the gravest) because it is placed between the first and third tetrachords, i. e. the hypaton and synemmenon.

MESOPOTAMIA, the ancient name of the province of Diarbeck, in Turkey in Asia. It is situated between the rivers Euphrates and Tigris; having Assyria on the east, Armenia on the north, Syria on the west, and Arabia Deserta with Babylonia on the south. The Hebrews called it Padan-aram (Gen. xxviii. 2, &c.) and Aram Nabaraim (title of Psal. lx.) or Aram of the two rivers, because it was first peopled by Aram father of the Syrians, and is situated between the two rivers already mentioned. This country is much celebrated in scripture, as being the first dwelling of men both before and after the deluge; and because it gave birth to Phaleg, Heber, Terah, Abraham, Nahor, Sarah, Rebekah, Rachel, Leah, and to the sons of Jacob. Babylon was in the ancient Mesopotamia, till, by vast labour and industry, the two rivers of the Tigris and Euphrates were united into one channel. The plains of Shinar were in the same country. Often they gave it the name of Mesopotamia (Deut. xxiii. 4, &c.) and sometimes that of Syria, (Hosea xii. 12.) Balaam son of Beor was of Mesopotamia, Deut. xxiii. 4. Chushan-rishathaim king of Mesopotamia kept the Hebrews in subjection some time after the death of Joshua, Judg. iii. 8.

MESOPTERYGIUS, in ichthyology, a term applied to such fishes as have only one back-fin, and that situated in the middle of the back.

MESORECTUM. (*mesorectum*, from μέσος, the middle, and *rectum*, the straight gut). The portion of peritonæum which connects the rectum to the pelvis.

MESPILUS. Medlar. In botany, a genus of the class icosandria, order pentagynia. Calyx five-cleft; petals five; styles from two to five; drupe inferior, with from two to five dispermous nuts. Twenty-two species, including those of the genus Cratægus of Linnéus; which ought not to be separated from it; chiefly North American plants: a few European and Asiatic. The chief are,

1. M. germanica. Common medlar. Unarmed; leaves lanceolate, somewhat downy; flowers solitary, sessile, terminal, with five styles. Found wild in our own hedges, bearing a brown fruit, of the size of small apples, which ripen in October, but are not eatable till they begin to decay.

2. M. chamæ-mespilus. Unarmed; leaves oval, acutely serrate, glabrous; flowers in corymbed heads; styles five: teeth of the calyx shorter than the tube. This plant bears a red fruit, which is called downy medley or bastard quince. It is a native of Austria.

3. M. cotoneaster. Dwarf quince.

ME'SPISE. *s.* (probably misprinted for *mesprise*; *mespris*, French.) Contempt; scorn (*Spenser*).

MESS. *s.* (*mes*, old French.) A dish; a quantity of food sent to table together (*Shaks.*).

*To* MESS. *v. n.* To eat; to feed.

MESSA DI VOCE. An expression applied by the Italians to a swell of the voice upon a holding note.

ME'SSAGE. *s.* (*message*, French). An errand; any thing committed to another to be told to a third (*South. Dryden*).

MESSALA, a name of Valerius Corvinus, from his having conquered Messana in Sicily. This family was very ancient; the most celebrated was a friend of Brutus, who seized the camp of Augustus at Philippi. He was afterwards reconciled to Augustus, and died A. D. 9, in his 77th year. (*Plut.*)

MESSALINA VALERIA, a daughter of Messala Barbatus. She married the emperor Claudius, and disgraced herself by her cruelties and incontinence. Her husband's palace was not the only seat of her lasciviousness, but she prostituted herself in the public streets. Her extravagances at last irritated her husband, who commanded her to appear before him. She attempted to destroy herself, and when her courage failed, one of the tribunes who had been sent to her despatched her with his sword, A. D. 48.

MESSANA, an ancient and celebrated town of Sicily, on the streights which separate Italy from Sicily. It was anciently called Zancle, and was founded 1600 years before the Christian era. The inhabitants were called Messenii, Messanienses, and Mamertini. The streights of Messana have always been looked upon as very dangerous, especially by the an-

cients, on account of the rapidity of the currents, and the irregular and violent flowing and ebbing of the sea. Now MESSINA, which see.

MESSAPIA, a country of Italy, between Tarentum and Brundusium, the same as Calabria. It received its name from Messapus, the son of Neptune, who left a part of Bœotia called Messapia, and came to Italy, where he assisted the Rutulians against Æneas.

MESSE CONCERTATI.(Ital.) Masses in which the recitation is intermixed with chorusses.

MESSE DI CAPELLA. An expression applied by the Italians to masses sung by their grand chorus. In these compositions, various fugues, double counterpoints, and other elaborate qualifications, are always required.

MESSENE, a daughter of Triopas, king of Argos, who married Polycaon, son of Lelex, king of Laconia. She encouraged her husband to levy troops, and to seize Peloponnesus, which, after it had been conquered, received her name. She received divine honours after death. (*Paus.*).

MESSENE or MESSENA, a city in the Peloponnesus, the capital of the country called Messenia, which is situate between Laconia Elis, Arcadia, and the sea. The inhabitants have rendered themselves famous for the three wars which they carried on against the Spartans, and which received the appellation of Messenian.

MESSENGER. *s.* (*messager*, French.) One who carries an errand; one who brings an account or foretoken of any thing (*Clarendon*).

MESSENGERS are certain officers chiefly employed under the direction of the secretaries of state, and always in readiness to be sent with all kinds of dispatches foreign and domestic. They also, by virtue of the secretaries warrants, take up persons for high treason, or other offences against the state. The prisoners they apprehend are usually kept at their own houses, for each of which they are allowed 6s. 8d. per day by the government: and when they are sent abroad, they have a stated allowance for their journey, viz. 30*l.* for going to Paris, Edinburgh, or Dublin; 25*l.* for going to Holland; and to other places in the same proportion; part of which money is advanced for the expence of their journey. Their standing salary is 45*l.* per annum; and their posts, if purchased, are esteemed worth 300*l.* The messengers wait 20 at a time, monthly, and are distributed as follows, viz. four at court, five at one secretary's office, five at another, two at the third for North Britain, three at the council office, and one at the lord chamberlain's of the household.

MESSENGERS OF THE EXCHEQUER, are four officers who attend the exchequer, in the nature of pursuivants, and carry the lord treasurer's letters, precepts, &c.

MESSENGER OF THE PRESS, a person who, by order of the court, searches printing-houses, booksellers shops, &c. in order to discover the printers or publishers of seditious books, pamphlets, &c.

MESSENIA, a province of Peloponnesus. See MESSENE.

MESSERCHMIDIA, in botany, a genus of the class pentandria, order monogynia. Corol funnel-form, with the throat naked, berry corky, bipartite, each two-seeded. Three species; two shrubs of the south of Europe, one of Teneriffe.

MESSIAH, a word signifying one anointed, or installed into an office by unction. It was usual among the Jews to anoint kings, high-priests, and sometimes prophets, at the designation or instalment of them, to signify emblematically the mental qualifications necessary for discharging these offices. Saul, David, Solomon, and Joash, kings of Judah, received the royal unction. Aaron and his sons received the sacerdotal, and Elisha the disciple of Elijah received the prophetic unction.—The name Messiah, anointed, or Christ (χριστος), was given to the kings and high-priests of the Jews. The patriarchs and prophets are also called by the name of Messiahs, or the Lord's anointed. See 1 Sam. xii. 3. 5. 1 Chron. xvi. 22. Psal. cv. 15.

But this name Messiah was principally, and by way of eminence, given by the Jews to their expected great Deliverer, whose coming they still vainly wait; and is a name the Christians apply to Jesus Christ, in whom the prophecies relating to the Messiah were accomplished. The sum of these prophecies is, that there should be a glorious person named Messiah, descended from Abraham, Isaac, and Jacob, who should be born at Bethlehem, of a virgin of the family of David, then in its decline, before the Jews ceased to be a people, while the second temple was standing, and about 500 years after Ezra's time; who, though appearing in mean circumstances, should be introduced by a remarkable forerunner, whose business it should be to awaken the attention and expectation of the people. That this illustrious person called Messiah should himself be eminent for the piety, wisdom, and benevolence of his character, and the miraculous works he should perform: yet that, notwithstanding all this, he should be rejected and put to death by the Jews; but should afterwards be raised from the dead, and exalted to a glorious throne, on which he should through all generations continue to rule, at the same time making intercession for sinners. That great calamities should for the present be brought on the Jews for rejecting him: whereas the kingdom of God should by his means be erected among the Gentiles, and disperse itself even unto the ends of the earth; wherever it came destroying idolatry, and establishing true religion and righteousness. In a word, that this glorious person should be regarded by all who believed in him as a divine teacher, an atoning sacrifice, and a royal governor: by means of whom God would make a covenant with his people, very different from that made with Israel of old; in consequence of which they should be restored to, and established in, the divine favour, and fixed in a state

of perpetual happiness. See JESUS CHRIST, and CHRISTIANITY.

Jesus Christ asserts himself the Messiah. In St. John iv. 25. the Samaritan woman says to Jesus, "I know that when Messiah comes, who is called the Christ, he will tell us all things." Jesus answered her, "I that speak to thee am he."

MESSIEURS. *s.* (French; plural of *monsieur.*) Sirs; gentlemen.

MESSINA, an ancient, large, handsome, and strong city of Sicily, and in the Val-di-Demona, with a citadel, several forts, a fine spacious harbour, and an archbishop's see. It is seated on the sea-side, 110 miles east of Palermo, 260 south by east of Rome, and 180 south-east of Naples. E. lon. 15. 50. N. lat. 38. 10. The public buildings and the monasteries were numerous and magnificent, and it contained about 60,000 inhabitants: the harbour is one of the safest in the Mediterranean, and extremely deep: the viceroy of Sicily resides here six months in the year; and it was a place of great trade in silk, oil, fruit, corn, and excellent wine, especially since it was declared a free port. This city in the beginning of the year 1783 suffered most dreadfully by the earthquakes, which shook great part of Calabria and Sicily to their foundations, overturned many rich and populous towns, and buried thousands in their ruins. See CALABRIA and EARTHQUAKE. An interesting account of Messina, as it stood before the above period, is given in Mr. Swinburne's Travels in Sicily.

MESSUAGE, MESSUAGIUM, in law, a dwelling-house, with some land adjoining assigned for its use. By the name of messuage may a garden, shop, mill, cottage, chamber, cellar, or the like, pass. In Scotland, messuage denotes what is called in England the manor house, viz. the principal dwelling-house within any barony.

MESOPORPHYRON, a name given by the Greeks to the Roman laticlave; because that garment, being edged on each side, where it opened before, with purple, appeared when closed with two purple stripes down the middle. The same term was also applied to the angusticlave.

ME'SSMATE. *s.* (*mess* and *mate.*) One who eats at the same table.

MESUA. In botany, a genus of the class monadelphia, order polyandria. Calyx single, four-leaved; petals four; pistil one; nut four-sided, one-seeded. One species; an Indian tree, with lanceolate entire leaves; axillary, sessile flowers.

META, in the Roman circus, was a pile of stones of a pyramidical form, intended as a boundary of the stadium, or chariot-course. When the meta was passed the seventh time, the race was concluded. The greatest art and management were required in avoiding the meta, and yet going as near it as possible. If they went too near, they were in the greatest danger of breaking the chariot to pieces; and if they took too large a circuit in the turn, they gave their rivals an opportunity of getting within them, besides losing a great deal of space.

MET. The preterit and part. of *meet.*

META'BASIS. *s.* (Greek.) In rhetorick, a figure by which the orator passes from one thing to another.

METACARPAL BONES. The five longitudinal bones that are situated between the wrist and the fingers; they are distinguished into the metacarpal bone of the thumb, fore-finger, &c.

METACARPUS. (*metacarpus*, μετακαρπος, from μετα, after, and καρπος, the wrist.) That part of the hand between the wrist and fingers.

METACHEIRI'XIS. (from μεταχειριζω, to operate by the hand.) Surgery: any manual operation or administration.

META'GRAMMATISM. *s.* (μετα and γραμμα.) A dissolution of a name truly written into its letters, as its elements, and a new connexion of it by artificial transposition, making some perfect sense applicable to the person named; anagrammatism (*Camden*).

METAL, in heraldry. There are two metals used in heraldry, by way of colours, viz. gold and silver, in blazon called *or* and *argent*. In the common painting of arms these metals are represented by white and yellow, which are the natural colours of those metals. In engraving, gold is expressed by dotting the coat, &c. all over; and silver, by leaving it quite blank.

It is a general rule in heraldry, never to place metal upon metal, nor colour upon colour; so that if the field be of one of the metals, the bearing must be of some colour; and if the field be of any colour, the bearing must be of one of the metals.

METALS, in mineralogy. Substances forming a distinct class from all other bodies, and characterized by their perfect opacity, peculiar splendour, density, and specific gravity. In their purest metallic state they possess neither taste nor smell. Metals generally constitute the fourth or fifth class in the systems of different mineralogists: in that of Gmelin, which we have chiefly made use of in the present work, they occupy the fourth, and are divided into two grand sections of malleable and brittle. Under Dr. Thomson's system, they are divided into the four following sections: 1. Malleable. 2. Brittle and easily fused. 3. Brittle and difficultly fused. 4. Refractory. Metals, says this ingenious chemist (for we cannot give a more condensed account of them than his own is), may be considered as the greatest instruments of all our improvements: without them many of the arts and sciences could hardly have existed. So sensible were the ancients of their great importance, that they raised those persons who first discovered the art of working them to the rank of deities. In chemistry, they have always filled a conspicuous station: at one period the whole science was confined to them; and it may be said to have owed its very existence to a rage for making and transmuting metals.

1. One of the most conspicuous properties

of the metals is a particular brilliancy which they possess, and which has been called the metallic lustre. There are other bodies indeed (mica for instance) which apparently possess this peculiar lustre, but in them it is confined to the surface, and accordingly disappears when they are scratched, whereas it pervades every part of the metals. This lustre is occasioned by their reflecting much more light than any other bodies; a property which seems to depend partly on the closeness of their texture. This renders them peculiarly proper for mirrors, of which they always form the basis.

2. They are perfectly opaque, or impervious to light, even after they have been reduced to very thin plates. Silver leaf, for instance, 1-160000th of an inch thick, does not permit the smallest ray of light to pass through it. Gold, however, when very thin, is not absolutely opaque: for gold leaf 1-280000th of an inch thick, when held between the eye and the light, appears of a lively green; and must therefore, as Newton first remarked, transmit the green-coloured rays. It is not improbable that all other metals, as the same philosopher supposed, would also transmit light if they could be reduced to a proper degree of thinness. It is to this opacity that a part of the excellence of the metals, as mirrors, is owing; their brilliancy alone would not qualify them for that purpose.

3. They may be melted by the application of heat, and even then still retain their opacity. This property enables us to cast them in moulds, and then to give them any shape we please. In this manner many elegant iron utensils are formed. Different metals differ exceedingly from each other in fusibility. Mercury is so very fusible, that it is always fluid at the ordinary temperature of the atmosphere; while other metals, as platinum, cannot be melted except by the most violent heat which it is possible to produce.

4. Their specific gravity is much greater than that of any other body at present known. Antimony, one of the lightest of them, is more than six times heavier than water; and the specific gravity of platinum, the heaviest of all the metals, is 23. This great density, no doubt, contributes considerably to the reflection of that great quantity of light which constitutes the metallic lustre.

5. They are the best conductors of electricity of all the bodies hitherto tried.

6. None of the metals are very hard; but some of them may be hardened by art to such a degree as to exceed the hardness of almost all other bodies. Hence the numerous cutting instruments which the moderns make of steel, and which the ancients made of a combination of copper and tin.

7. The elasticity of the metals depends upon their hardness; and it may be increased by the same process by which their hardness is increased. Thus the steel of which the balance-springs of watches are made is almost perfectly elastic, though iron in its natural state possesses but little elasticity.

8. But one of their most important properties is malleability, by which is meant the capacity of being extended and flattened when struck with a hammer. This property, which is peculiar to metals, enables us to give the metallic bodies any form we think proper, and thus render it easy for us to convert them into the various instruments for which we have occasion. All metals do not possess this property; but it is remarkable that almost all those which were known to the ancients have it. Heat increases this property considerably. Metals become harder and denser by being hammered.

9. Another property, which is also wanting in many of the metals, is ductility; by which we mean the capacity of being drawn out into wire, by being forced through holes of various diameters.

10. Ductility depends, in some measure, on another property which metals possess, namely, tenacity; by which is meant the power which a metallic wire of a given diameter has of resisting, without breaking, the action of a weight suspended from its extremity. Metals differ exceedingly from each other in their tenacity. An iron wire, for instance, 1-10th of an inch in diameter, will support, without breaking, about 500lb. weight; whereas a lead wire, of the same diameter, will not support above 29lb.

11. When exposed to the action of heat and air, most of the metals lose their lustre, and are converted into earthy-like powders of different colours and properties, according to the metal and the degree of heat employed. Several of the metals even take fire when exposed to a strong heat; and after combustion the residuum is found to be the very same earthy-like substance.

12. If any of these calces, as they are called, is mixed with charcoal-powder, and exposed to a strong heat in a proper vessel, it is changed again to the metal from which it was produced. This fact is easily explained on the principles of modern chemistry; the calx is the metal combined with oxygen, or an oxyd, in modern language, and by heating it with charcoal, which has a stronger attraction for oxygen, that substance is taken from the metal, and it is brought again to the metallic state. The oxygen in this process, uniting with the charcoal, forms carbonic acid gass.

The words calx and calcination, then, are evidently improper, as they convey false ideas; philosophers therefore now employ, instead of them, the words oxyd and oxydizement, which were invented by the French chemists. A metallic oxyd signifies a metal united with oxygen; and oxydizement implies the act of that union.

13. Metals, then, are all capable of combining with oxygen; and this combination is sometimes accompanied by combustion, and sometimes not. The new compounds formed

are called metallic oxyds, and in some cases metallic acids. These were formerly distinguished from each other by their colour. One of the oxyds, for instance, was called black oxyd, another was termed red oxyd; but it is now known that the same oxyd is capable of assuming different colours according to circumstances. The mode of naming them from their colour, therefore, wants precision, and is apt to mislead; especially as there occur different examples of two distinct oxyds of the same metal having the same colour.

As it is absolutely necessary to be able to distinguish the different oxyds of the same metal from each other with perfect precision, and as the present chemical nomenclature is defective in this respect, we may, till some better method is proposed, distinguish them from each other, by prefixing to the word oxyd the first syllable of the Greek ordinal numerals. Thus the protoxyd of a metal will denote the metal combined with a minimum of oxygen, or the first oxyd which the metal is capable of forming; deutoxyd will denote the second oxyd of a metal, or the metal combined with two doses of oxygen. When a metal has combined with as much oxygen as possible, the compound formed is denoted by the term peroxyd; indicating by it, that the metal is thoroughly oxydized.

Thus we have the term oxyd to denote the combination of metals with oxygen in general; the terms protoxyd and peroxyd to denote the minimum and maximum of oxydizement; and the terms deutoxyd, tritoxyd, &c. to denote all the intermediate states which are capable of being formed.

14. Metals are capable also of combining with the simple combustibles. The compounds thus formed are denoted by the simple combustible which enters into the combination, with the termination uret added to it. Thus the combination of a metal with sulphur, phosphorus, or carbon, is called the sulphuret, phosphuret, or carburet of the metal. Hydrogen has not been proved capable of entering into similar combinations; neither have the simple incombustibles.

15. The metals are capable likewise of combining with each other, and of forming compounds, some of which are extremely useful in the manufacture of instruments and utensils. Thus pewter is a compound of lead and tin; brass, a compound of copper and zinc; bell-metal, a compound of copper and tin. These metallic compounds are called by chemists alloys, except when one of the combining metals is mercury. In that case the compound is called an amalgam. Thus the compound of mercury and gold is called the amalgam of gold.

16. The metals at present known amount to 28: of these only seven were known to the ancients as metals, and no fewer than 17 have been discovered since the year 1730: their number has multiplied exceedingly within these few years; but the more recently discovered metals, with a very small number of exceptions, are so scarce as to be of comparatively small importance. Metals may be conveniently arranged under four classes: namely, 1. Malleable metals. 2. Brittle and easily fusible. 3. Brittle and difficultly fusible. 4. Refractory: under which last name are comprehended all those metallic bodies which are only known at present in a state of combination; chemists not having succeeded hitherto in reducing them to the metallic state. The metals which belong to each of these heads will be seen from the following table.

| | |
|---|---|
| **I. Malleable.** | |
| 1. Gold, | 8. Osmium, |
| 2. Platina, | 9. Copper, |
| 3. Lead, | 10. Iron, |
| 4. Mercury, | 11. Nickel, |
| 5. Palladium, | 12. Tin, |
| 6. Rhodium, | 13. Lead, |
| 7. Iridium, | 14. Zinc. |
| **II. Brittle and easily fused.** | |
| 1. Bismuth, | 3. Tellurium, |
| 2. Antimony, | 4. Arsenic. |
| **III. Brittle and difficultly fused.** | |
| 1. Cobalt, | 4. Molybdenum, |
| 2. Manganese, | 5. Uranium, |
| 3. Chromium, | 6. Tungsten. |
| **IV. Refractory.** | |
| 1. Titanium, | 3. Tantalium, |
| 2. Columbrium, | 4. Cerium. |

Such is the change, however, which is perpetually taking place in the modern science of chemistry, if science it may yet be called, that although we have drawn up the above table from the third and latest edition of Dr. Thomson's work, we have now to observe, that from this table one at least is now to be struck out, Dr. Wollaston having fairly established it, that tantalium (or tantalum as it is often called) and columbium are the same metal; while two unquestionably are to be added to it from the brilliant discoveries of Mr. Davy, potasium and sodium, of which potash and soda may now be contemplated as the oxyds.

In reality the illimitable scope which the voltaic power in the hands of this admirable chemist has unfolded to us, altogether confounds us, and renders it impossible to determine either what principles we are to set out with or where we are to stop. For, although he has not been equally decisive in his experiments, he has given great ground for believing that ammonia itself, and indeed all the alkaline earths, are only so many metallic oxyds, to the metals of which he has also given the respective names of ammonium, barium, strontium, and magnium. While not content with speculating concerning the earths and alkalies, he has ventured into the region of the gasses, and has shewn some reason for suspecting that at least two of these, nitrogen and hydrogen, are also metallic oxyds in a state of gass, as mercury becomes when exposed to a high degree of heat. The proper earths, nay, even sulphur and phosphorus, are also suspected of being compounds of the same kind: so that if these bold and comprehensive views should

ever be substantiated, we shall be reduced to the two principles alone of oxygen and the metallic base of bodies, operated upon in various ways by electricity. We shall resume this subject under the article VOLTAISM.

Of the metals enumerated in the table above, those of the first class were formerly called metals, by way of eminence, because they are possessed either of malleability or ductility, or of both properties together: the rest were called semi-metals, because they are brittle. But this distinction is now pretty generally laid aside; and, as Bergman observes, it ought to be so altogether, as it is founded on a false hypothesis, and conveys very erroneous ideas to the mind. The first four metals were formerly called noble or perfect metals, because their oxyds are reducible by the mere application of heat; the rest were imperfect metals, because their oxyds were thought not reducible without the addition of some combustible substance; but this distinction also is now very properly exploded: for nickel and lead, which were never admitted into the number of the noble metals, are well known to be reducible by mere heat, and have hence as fair pretensions to such a classification as gold or silver.

The following synoptic table gives us a bird's eye view of most of the characteristic properties of the different metals, and their chemical relation to each other. Cerium is omitted, as its relative properties have not been sufficiently ascertained, and potasium and sodium for the same reason.

METALS
- oxydable by heat
  - acidifiable
    - volatile: Arsenic
    - fixed: Molybdenum, Tungsten, Chrome, Columbium
  - not acidifiable
    - brittle
      - infusible or granular: Osmium, Uranium
      - fusible: Titanium, Tellurium, Manganese, Cobalt, Antimony, Bismuth
    - malleable: Zinc, Lead, Tin, Iron, Copper, Mercury
- not oxydable by heat
  - granular and brittle: Iridium, Rhodium
  - fusible and malleable: Palladium, Nickel, Platina, Silver, Gold

For a more particular account of the different metals, we refer the reader to the various articles under their respective names.

METALEPSIS, in rhetoric, is a figure in which two or more tropes, and those of a different kind, are contained under one word; so that several gradations, or intervening senses, come between the word that is expressed and the thing designed by it. Thus, when Sylla says of Julius Cæsar, *In one Cæsar there are many Marius's.* Suet. in Vit. c. 1. This is a metalepsis. So when Virgil, describing that part of the African coast, where Æneas arrived with his ships, says, *a dark wood hung over it.* Æn. lib. i. ver. 165.

META'LLICAL. META'LLIC. *a.* (from *metalium,* Latin.) Partaking of metal; containing metal; consisting of metal (*Wotton*).

METALLI'FEROUS. *a* (*metallum* and *fero,* Latin.) Producing metals.

META'LLINE. *a.* (from *metal.*) 1. Impregnated with metal (*Bacon*). 2. Consisting of metal (*Boyle*).

ME'TALLIST. *s.* (*metalliste,* French.) A worker in metals; one skilled in metals (*Moxon*).

METALLO'GRAPHY. *s.* (*metallum* and *γϱώφω.*) An account or description of metals.

ME'TALLURGIST. *s.* (*metallum* and *ἔργον.*) A worker in metals.

METALLURGY. (from *metallum,* Lat. and εργον, operation, Gr. whence the term, though admitted into all European languages, is unclassical and illigitimate in its formation). The art of working metallic substances from a state of pyrite and ore to a state of perfect metallization.

We find it unnecessary, however, to enter in this article into the full extent of the subject we should otherwise have done, in consequence of our having entered pretty largely into the general character of metals in the article METAL, and into the general mode of assaying and reducing ores in the different articles allotted to the respective metals, as they have thus far occured alphabetically. To the article MINE we may also more advantageously refer a detailed account of the mode of detecting, the bearing, range, and general na-

ture of mines. So that we shall at present limit ourselves to a few practical observations on the best means of opening a mine when detected, and determined upon, and of working the pyrites and ores of which it may be expected to consist.

*Of opening Mines.*

When it is once ascertained that a pyrite or ore of metal can be worked with advantage, the metallurgist proceeds in his operations, by extracting the metallic matter by all the mechanical methods the art possesses, which consists in digging shafts, opening adits, employing various machines to raise the water, renew the air, bring up the ore, favour the ascent and descent of the miner, prevent the earth from giving way, &c.

In general, after having bored the ground that contains ores, or having ascertained their existence by various indications (see MINE), a square perpendicular well or shaft is dug in the ground, sufficiently wide to place straight ladders in it, over which machinery is fixed for the purpose of raising and lowering vessels, and in which it is sometimes necessary to fix pumps to draw off the water which is collected. If the ore be too deep for a single shaft to lead from the grass or surface to the vein at the bottom of the first shaft, a horizontal gallery is opened, at the end of which a second shaft is sunk, and in this manner the workmen proceed till they arrive at the bottom of the mine.

When the rock to be perforated is hard and solid, and capable of supporting itself, the shaft will not require to be guarded within; but if it be soft and friable, if it threaten to fall in during the excavation, it becomes necessary to support the shaft and gallery with pieces of woodwork, covered with planks all round.

It is also of the utmost consequence to obtain a free current of fresh air. When it is practicable to open a gallery which shall lead from the bottom of the shaft to the day or open air, a current is easily established by this simple artifice. When this is not possible, a second shaft is sunk to the extremity of the gallery opposite to the first. When one of these shafts opens at a different level from the other, the circulation and renewal of the air are easy. If the secondary shafts be of equal height, the circulation will not take place spontaneously, and a lighted furnace must be employed in some convenient part of them to produce a greater rarefaction of the confined air.

It is also necessary to provide against a dangerous ascent of waters. If the water transude gradually through the earth, it may be let off into the plain or the nearest river, by means of a horizontal adit. If it be collected in a greater quantity, or if it be not possible to open such an adit, the water is extracted by pumps, which are moved either by a stream or by a pond, or by vapour of water from an adjoining steam-engine. It is sometimes extremely difficult to defend the works against enormous masses of water, which rush forth with prodigious rapidity. These cases, however, are not common; and they are provided against by a kind of moveable strong door, or barricado, which the workmen place at the moment they find by the particular sound of the rock that the waters are coming in upon them, and hence they gain time to save themselves from being overwhelmed

The destructive elastic fluids, which so frequently are disengaged in the cavities of mines, and particularly the carbonic acid gass, and different species of mixed hydrogen gasses, the former of which is known by the name of *choak-damp*, and the latter by that of *fire-damp*, are also among the most formidable enemies of miners. Galleries, fires, ventilators, inflammations, by means of torches held at a great distance in those parts of the mines which are thus mephitized, and particularly the various methods of causing fresh air to enter, are the only remedies which can be opposed to those subterranean evils.

Few metals are found in a pure state, gold, silver, and sometimes copper excepted. The others are usually found in the state of ores, and pyrites or sulphurets, which may also be regarded as a kind of ore, intermixed and blended with a variety of extensive matters, so as not to have the ductility or other qualities of metals. The first operation however, when the metallurgist has advanced thus far, is to separate the one, of whatever kind it may be, from its bed or matrix. When it is found in large masses, most of it may be dug up free from the matrix, and the substances to which it adheres may be freed by a hammer: but as the ore is often intimately mixed with the matrix, it is necessary to try other methods for its reduction: and of this we shall treat in a subsequent section.

*Of Ores and Pyrites.*

Pyrite is a mineral resembling the true ores of metals, in the substances of which it is composed, in its colour or lustre, in its great weight, and, lastly, in the parts of the earth in which it is found, since it almost always accompanies ores. It is, like ores composed of metallic substances, mineralized by sulphur or by arsenic, or by both these matters, and of an unmetallic earth intimately united with its other principles.

Hence, notwithstanding the conformity of pyrites with ores properly so called, metallurgists generally distinguish the former from the latter; because the proportion and connection of the materials composing the pyrites differ much from those of ores. Thus, although sometimes pyrite contains more metal than some ores, yet generally it contains less metal, and a larger quantity of mineralising substances, sulphur, and arsenic, and particnlarly of unmetallic earth. The connection of these matters is also much stronger in pyrites than in ores, and they are accordingly much harder; so that almost every pyrite can strike sparks from steel.

From the above property of striking sparks from steel they have been called pyrite or pyrites; which is a Greek word signifying fire-stone. Pyrites was formerly used for fire-arms, as we now use flints; hence it was called carabine-stone. It is still named by some marcasite. Perhaps no other kind of natural body has received so many names.

Pyrite differs also from ores by its forms and positions in the earth. Although pyritous metals generally precede, accompany, and follow veins of ores, they do not, properly speaking, themselves form the oblong and continued masses called veins, as ores do; but they form masses sometimes greater and sometimes smaller, but always distinct from each other. Large quantities of them are often found unaccompanied by ores. They are formed in clays, chalk, marles, marbles, plasters, alabasters, slates, spars, quartz, granites,

crystals, in a word, in all earths and stones. Many of them are also found in pit-coals and other bituminous matter.

Pyrite is also distinguishable from ores by its lustre and figure; which is almost always regular and uniform, externally or internally, or both. Some ores indeed, like those of lead, many ores of silver, and some others, have regular forms, and are in some manner crystallised; but this regularity of form is not so universal and so conspicuous in ores as in pyrites. The lustre of pyrite seems to be caused by its hardness, and the regularity of its form by the quantity of mineralising substances which it contains.

By all these marks we may easily, and without analysis, distinguish pyrites from true ores. When we see a mineral that is heavy possessed of metallic lustre, and of any regular form, the mass of which appears evidently to be entire, that is, not to have been a fragment of another mass, and which is so hard as to be capable of striking sparks from steel, we may be assured that such a mineral is a pyrite and not an ore.

The class of pyrites is very numerous, various, and extensive. They differ one from another in the nature and proportions of their component parts, in their forms, and in their colours. The forms of these minerals are exceedingly various. No solid, regular or irregular, can easily be conceived, that is not perfectly imitated by some kind of pyrites. They are spherical, oval, cylindrical, pyramidal, prismatical, cubic; they are solids with 5, 6, 7, 8, 9, 10, &c. sides. The surface of some is angular, and consists of many bases of small pyramids; while their substance is composed of these pyramids, the points of which all unite in the centre of the mass.

Pyritous minerals differ also in their component substances. Some of them are called sulphureous, martial, cupreous, arsenical, as one or other of these substances predominate. We must observe with Henckel, that in general all pyrites are martial; as ferruginous earth is the essential and fundamental part of every pyrite. This earth is united with an unmetallic earth, with sulphur or arsenic, or with both these matters, in which case the sulphur always predominates over the arsenic, as Henckel observes. He considers these as the only essential principles of pyrites; and believes that all the other matters, metallic or unmetallic, which are found in it, are only accidental: amongst which he even includes copper, although so much of it exists in some kinds of pyrites, that these are treated as ores of copper, and sometimes contain 50lb. of copper each quintal. Many other metals, even gold and silver, are sometimes combined in pyrites; but these are less frequent, and the precious metals always in very small quantities; they are therefore justly to be considered as accidental to pyrites. The different substances composing pyrites sensibly affect its colours. Henckel distinguishes them in general into three colours, white, yellowish or a pale yellow, and yellow. He informs us, that these three colours are often so blended one with another, that they cannot be easily distinguished unless when compared together.

The white pyrites contain most arsenic, and are similar to cobalt and other minerals abounding in arsenic. The Germans call them mispickle, or mispilt. Iron and arsenic form the greatest part of this pyrites. As arsenic has the property of whitening copper; some pyritous minerals almost white, like that of Chemnitz in Misnia, are found to contain 40 pounds of copper per quintal, and which are so much whitened by the arsenic that they are very like white pyrites. But these pyritous matters are very rare, and are never so white as the true white pyrites, which is only ferruginous and arsenical.

Yellowish pyrite is chiefly composed of sulphur and iron. Very little copper and arsenic are mixed with any pyrites of this colour, and most of them contain none of these two metallic substances. This is the most common kind of pyrite: it is to be found almost every where. Its forms are chiefly round, spherical, oval, flattened, cylindrical; and it is composed internally of needles or radii which unite in the centre, or in the axis of the solid.

Yellow pyrite receives its colour from the copper and sulphur which enter into its composition. Its colour, however, is inclined to a green; but is sufficiently yellow to distinguish it from the other two kinds of pyrites, particularly when they are compared together. To make this comparison well, the pyrite must be broken, and the internal surfaces must be placed near each other. The reason of this precaution is, that the colour of minerals is altered by exposure to the air.

Persons accustomed to these minerals can easily distinguish them. The chief difficulty is, to distinguish pyrite from cobalt and other minerals; which also contain some copper and much arsenic.

Hence then we see, that arsenic is the cause of whiteness in pyrite, and is contained in every pyrite of that colour; that copper is the principal cause of the yellow colour of pyrites; and that every pyrite which is evidently yellow contains copper; that sulphur and iron produce a pale-yellow colour, which is also produced by copper and arsenic: hence some difficulty may arise in distinguishing pyrites by its colours. We may also observe, that sulphur and arsenic, without any other substance, form a yellow compound, as we see from the example of orpiment or yellow arsenic. Thus, although the colours of the pyrites enable us to distinguish its different kinds, and to know their nature at first sight, particularly when we have been accustomed to observe them; yet we cannot be entirely certain concerning the true nature of these minerals, and even of all minerals in general, that is, to know precisely the kinds and proportions of their component substances, but by chemical analysis and decomposition.

Besides the above-mentioned matters which compose pyrites, it also contains a considerable quantity of unmetallic earth; that is, an earth which cannot by any process be reduced to metal. Henckel, Crame, and all those who have examined this matter, mention this earth, and prove its existence.

We ought to observe that this earth is combined with the other principles of the pyrite, and not merely interposed betwixt its parts. It must therefore be distinguished from other earthy and stony matters mixed accidentally with pyrite, and which do not make a part of it, since they may be separated by mechanical means, and without decomposing that mineral: but the earth of which we now treat is intimately united with the other constituent parts of the pyrite, is even a constituent part of pyrite, and essential to the existence of this mineral, and cannot be separated but by a total decomposition of it.

According to Henckel, this unmetallic earth abounds much in the white pyrites, since he found from the analyses which he made, that the iron,

which is the only metal existing in these pyrites, is only about one-twentieth part of the fixed substance that remains after the arsenic has been expelled by torrefaction or sublimation. A much larger quantity of iron is in the pale-yellow pyrite. The proportion of iron is generally about twelve pounds to a quintal of pyrites, and sometimes fifty or sixty pounds: this is therefore called martial pyrites. It contains about one-fourth of its weight of sulphur, and the rest is unmetallic earth. The quantity of unmetallic earth contained in the yellow or cupreous pyrites, which are also martial, since, as we have observed, iron is an essential part of every pyrite, has not yet been determined. They probably contain some of that earth, though perhaps less of it than the others.

Although pyrites are not so valuable as true ores, because in general they contain less metal, and but exceedingly little of the precious metals; and because their metallic contents are so difficult to be extracted, that, excepting cupreous pyrite, which is called pyritous copper ore, they are not worked for the sake of the contained metal; yet they are applied to other purposes, and furnish us with many useful substances; for hence we obtain all our green and blue vitriols, much sulphur, arsenic, and orpiment.

As all pyrites contain iron, and most of them contain also sulphur; as the pyrite most frequently found contains only these two substances with the unmetallic earth; and as iron and sulphur have a singular action upon each other when they are well mixed together and moistened; hence many kinds of pyrites, particularly those which contain only the principles now mentioned, sustain a singular alteration, and even a total decomposition, when exposed during a certain time to the combined action of air and water. The moisture gradually penetrates them, divides and attenuates their parts; the acid of the sulphur particularly attacks the martial earth, and also the unmetallic earth; its inflammable principle is separated from it, and is dissipated. While these alterations happen, the pyrite changes its nature. The acid of the sulphur, which is decomposed, forms, with the fixed principles of the pyrites, vitriolic, aluminous, and selenitic salts; so that a pyrite, which was once a shining, compact, very hard mineral, becomes in a certain time a greyish, saline, powdery mass, the taste of which is saline, austere, and styptic.

Lastly, if this mass be lixiviated with water, crystals of vitriol, and sometimes of alum, according to the nature of the pyrite employed, may be obtained by evaporation and crystallization.

This alteration and spontaneous decomposition of pyrite is called efflorescence and vitriolization; because the pyrites become covered with a saline powder, and because vitriol is always formed. This vitriolization is more or less quickly accomplished in pyrite according to its nature. It is a kind of fermentation excited by moisture amongst the constituent parts of these minerals; and it is so violent in those which are most disposed to it, that is, in the pale yellow pyrites, which contain chiefly sulphur and iron, that, when the quantity of these is considerable, not only a sulphureous vapour and heat may be perceived, but also the whole kindles and burns intensely. The same phenomena are observable, and the same results are formed, by mixing well together and moistening a large quantity of filings of iron and powdered sulphur; which experiment Lemeri has made, to explain the causes of subterranean fires and volcanoes.

We cannot doubt that, as the earth contains very large masses of pyrites of this kind, they must undergo the same changes when air and moisture penetrate the cavities containing them; and the best natural philosophers agree, that very probably this surprising decomposition of pyrites is the cause of subterranean fires, of volcanoes, and of mineral waters, vitriolic, aluminous, sulphureous, hot and cold.

No other pyrite is subject to this spontaneous decomposition when exposed to humid air, but that which is both martial and sulphureous; that is, the pale yellow pyrite. The arsenical pyrite, or that which contains little or no sulphur, is not changed by exposure to air. This latter kind is harder, heavier, and more compact than the former. The pyrite which is angular and regularly shaped is chiefly of this kind. Waller, in his Mineralogy, proposes to distinguish this kind of pyrite by the name of marcasite. When cut, it may be polished so well as to give a lustre almost equal to that of diamonds, but without refracting or decomposing the light; for it is perfectly opaque. It has been employed some years past in the manufacture of toys, as of buckles, necklaces, &c. and is called in commerce marcasite. See ARSENICUM.

### *Of working Ores and Pyrites.*

There are two grand objects which the mineralist and metallurgist have in view in opening mines: these are the extraction of sulphur from the mineral mass, and the reduction of the metallic matter to a state of metal; which last operation, when employed in the large way, is called smelting. We shall offer a few words upon each.

*Extraction of Sulphur from Pyrites and other Minerals.*—In obtaining sulphur from pyrites, this mineral ought to be exposed to a heat sufficient to sublime the sulphur, or to make it distil in vessels, which must be close, to prevent its burning.

Sulphur is extracted from pyrites at a work at Schwartzember, in Saxony, in the high country of the mines; and in Bohemia at a place called Alten-Sattel: and here the furnaces employed for this operation are oblong, like vaulted galleries; and in the vaulted roofs are made several openings. These are called furnaces for extracting sulphur.

In these furnaces are placed earthen-ware tubes, filled with pyrites broken into pieces of the size of small nuts. Each of these tubes contains about fifty pounds of pyrites. They are placed in the furnace almost horizontally, and have scarcely more than an inch of descent. The ends, which come out of the furnace five or six inches, become gradually narrower. Within each tube is fixed a piece of baked earth, in form of a star, at the place where it begins to become narrower, in order to prevent the pyrites from falling out, or choking the mouth of the tube. To each tube is fitted a receiver, covered with a leaden pipe, pierced with a small hole to give air to the sulphur. The other end of the tube is exactly closed. A moderate fire is made with wood, and in eight hours the sulphur of the pyrites is found to have passed into the receivers. The residuum of the pyrites, after the distillation, is drawn out at the large end, and fresh pyrites is put in its place. From this residuum, which is called burnings of sulphur, vitriol is extracted. The eleven tubes, into which were put, at three several distillations, in all nine quintals, or nine hundred pounds of pyrites, yield from one hundred to one hundred and fifty pounds of crude sulphur, which is so impure as to require to be purified by a second distillation.

This purification of crude sulphur is also done in

a furnace in form of a gallery, in which five iron cucurbits are arranged on each side. These cucurbits are placed in a sloping direction, and contain about eight quintals and a half of crude sulphur. To them are luted earthen tubes, so disposed as to answer the purpose of capitals. The nose of each of these tubes is inserted into an earthen pot called the fore-runner. This pot has three openings; namely, that which receives the nose of the tube; a second smaller hole, which is left open to give air; and a third in its lower part, which is stopped with a wooden peg.

When the preparations are made, a fire is lighted about seven o'clock in the evening, and is a little abated as soon as the sulphur begins to distil. At three o'clock in the morning, the wooden pegs which stop the lower holes of the fore-runners are for the first time drawn out, and the sulphur flows out of each of them into an earthen pot with two handles, placed below for its reception. In this distillation the fire must be moderately and prudently conducted; otherwise less sulphur would be obtained, and it also would be of a grey colour, and not of the fine yellow which it ought to have when pure. The ordinary loss in the purification of eight quintals of crude sulphur is, at most, one quintal. When all the sulphur has flowed out, and has cooled a little in the earthen pots, it is cast into moulds made of beech-tree, which have been previously dipt in water and set to drain. As soon as the sulphur is cooled in the moulds, they are opened, and the cylinders of sulphur are taken out and put up in casks. These are called roll-brimstone.

As sulphur is not only in pyrites, but also in most metallic minerals, it is evident that it might be obtained by works in the great from the different ores which contain much of it, and from which it must be separated previously to their fusion: but as sulphur is of little value, the trouble of collecting it from ores is seldom taken. Smelters are generally satisfied with freeing their ores from it, by exposing them to a fire sufficient to expel it. This operation is called torrefaction, or roasting of ores. There are, however, ores which contain so much sulphur, that part of it is actually collected in the ordinary operation of roasting, without much trouble for that purpose. Such is the ore of Ramelsberg in the country of Hartz: which is an ore of lead, containing silver, is partly very pure, and partly mixed with cupreous pyrites and silver; hence it is necessary to roast it.

The roasting is performed by laying alternate strata of ore and wood upon each other in an open field, taking care to diminish the size of the strata as they rise higher; so that the whole mass shall be a quadrangular pyramid truncated above, whose base is about 31 feet square. Below, some passages are left open, to give free entrance to the air; and the sides and top of the pyramid are covered over with small ore, to concentrate the heat, and make it last longer. In the centre of this pyramid there is a channel which descends vertically from the top to the base. When all is properly arranged, ladlefulls of red-hot scoria from the smelting furnace are thrown down the channel, by which means the shrubs and wood placed below for that purpose are kindled, and the fire is from them communicated to all the wood of the pile, which continues burning till the third day. At that time the sulphur of the mineral becomes capable of burning spontaneously, and of continuing the fire after the wood is consumed.

When this roasting has been continued fifteen days, the mineral becomes greasy; that is, it is covered over with a kind of varnish: twenty or twenty-five holes or hollows are then made in the upper part of the pile in which the sulphur is collected. From these cavities the sulphur is taken out thrice every day, and thrown into water. This sulphur is not pure, but crude; and is therefore sent to the manufacturers of sulphur, to be purified in the manner above related.

As this ore of Ramelsberg is very sulphureous, the first roasting, which we are now describing, lasts three months; and during this time, if much rain has not fallen, or if the operation has not failed by the pile falling down or cracking, by which the air has so much free access that the sulphur is burnt and consumed, from ten to twenty quintals of crude sulphur are by this method collected.

Metallic minerals are not the only substances from which sulphur is extracted. This matter is diffused in the earth in such quantities that the metals cannot absorb it all. Some sulphur is found quite pure, and in different forms, principally in the neighbourhood of volcanoes, in caverns, and in mineral waters. Such are the opaque kind, called virgin-sulphur; the transparent kind, called sulphur of Quito; and the native flowers of sulphur, as those of the waters of Aix-la-Chapelle. It is also found mixed with different earths. Here we may observe, that all those kinds of sulphur which are not mineralised by metallic substances are found near volcanoes, or hot mineral waters, and consequently in places where nature seems to have formed great subterranean laboratories, in which sulphureous minerals may be analysed and decomposed, and the sulphur separated, in the manner in which it is done in small in our works and laboratories. However that be, certainly one of the best and most famous sulphur-mines in the world is that called Solfatara. The Abbe Nollet has published, in the Memoirs of the Academy, some interesting observations upon this subject, which we shall here abridge.

Near Puzzoli, in Italy, is that great and famous mine of sulphur and alum, called at present Solfatara. It is a small oval plain, the greatest diameter of which is about four hundred yards, raised about three hundred yards above the level of the sea. It is surrounded by high hills and great rocks, which fall to pieces, and whose fragments form very steep banks. Almost all the ground is bare and white, like marle; and is every where sensibly warmer than the atmosphere in the greatest heat of summer, so that the feet of persons walking there are burnt through their shoes. It is impossible not to observe the sulphur there; for every-where may be perceived by the smell a sulphureous vapour, which rises to a considerable height, and gives reason to believe that there is a subterraneous fire below, from which that vapour proceeds.

Near the middle of this field there is a kind of bason three or four feet lower than the rest of the plain, in which a sound may be perceived when a person walks on it, as if there were under his feet some great cavity, the roof of which was very thin. After that, the lake Agnano is perceived, whose waters seem to boil. These waters are indeed hot, but not so hot as boiling water. This kind of ebullition proceeds from vapours which rise from the bottom of the lake, which being set in motion by the action of subterranean fires, have force enough to raise all that mass of water. Near this lake there are pits, not very deep, from which

sulphureous vapours are exhaled. Persons who have the itch come to these pits, and receive the vapours in order to be cured. Finally, there are some deeper excavations, whence a soft stone is procured which yields sulphur. From these cavities vapours exhale, and issue out with noise, and which are nothing else than sulphur subliming through the crevices. This sulphur adheres to the sides of the rocks, where it forms enormous masses: in calm weather the vapours may be evidently seen to rise twenty-five or thirty feet from the surface of the earth.

These vapours, attaching themselves to the sides of the rocks, form enormous groups of sulphur, which sometimes fall down by their own weight, and render these places of dangerous access. In entering the Solfatara, there are warehouses and buildings erected for the refining of sulphur. Under a great shed, or hangar, supported by a wall behind, and open on the other three sides, the sulphur is procured by distillation from the soft stones we mentioned above. These stones are dug from under the ground; and those which lie on the surface of the earth are neglected. These last are, however, covered with a sulphur ready formed, and of a yellow colour: but the workmen say they have lost their strength, and that the sulphur obtained from them is not of so good a quality as the sulphur obtained from the stones which are dug out of the ground.

These last are broken into lumps, and put into pots of earthen ware, containing each about twenty pints, Paris measure. The mouths of these pots are as wide as their bottoms; but their bellies, or middle parts, are wider. They are covered with a lid of the same earth, well luted, and are arranged in two parallel lines along two brick walls, which form the two sides of a furnace. The pots are placed within these walls; so that the centre of each pot is in the centre of the thickness of the wall, and that one end of the pots overhangs the wall within, while the other end overhangs the wall without. In each furnace ten of these pots are placed: that is, five in each of the two walls which form the two sides of the furnace. Betwixt these walls there is a space of fifteen or eighteen inches; which space is covered by a vault resting on the two walls. The whole forms a furnace seven feet long, two feet and a half high, open at one end, and shut at the other, excepting a small chimney through which the smoke passes.

Each of these pots has a mouth in its upper part without the furnace, in order to admit a tube of eighteen lines in diameter, and a foot in length, which communicates with another pot of the same size placed without the building, and pierced with a round hole in its base of fifteen or eighteen lines diameter. Lastly, to each of these last-mentioned pots there is a wooden tub placed below, in a bench made for that purpose. Four or five of these furnaces are built under one hangar or shed. Fires are kindled in each of them at the same time; and they are thrown down after each distillation, either that the pots may be renewed, or that the residuums may be more easily taken out. The fire being kindled in the furnace, heats the first pots containing the sulphureous stones. The sulphur rises in fumes into the upper part of the pot, whence it passes through the pipe of communication into the external vessel. There the vapours are condensed, become liquid, and flow through the hole below into the tub, from which the sulphur is easily turned out, because the form of the vessel is that of a truncated cone, whose narrower end is placed below, and because the hoops of the tub are so fastened that they may be occasionally loosened. The mass of sulphur is then carried to the buildings mentioned before, where it is remelted for its purification, and cast into rolls, such as we receive it.

*Smelting of ores in general.*—As ores consist of metallic matters combined with sulphur and arsenic, and are besides intermixed with earthy and stony substances of all kinds, the intention of all the operations upon these compound bodies is to separate these different substances from each other. This is effected by several operations founded on the known properties of those substances. We now proceed to give a general idea of these several operations.

First of all, the ore is to be separated from the earths and stones accidentally adherent to it; and when these foreign substances are in large masses, and are not very intimately mixed in small particles with the ore, this separation may be accomplished by mechanical means. This ought always to be the first operation, unless the adherent substance be capable of serving as a flux to the ore. If the unmetallic earths be intimately mixed with the ore, this must necessarily be broken and divided into small particles. This operation is performed by a machine which moves pestles called bocords or stampers. After this operation, when the parts of the mineral are specifically heavier than those of the unmetallic earth or stone, these latter may be separated from the ore by washing in canals through which water flows. With regard to this washing of ores it is necessary to observe, that it cannot succeed but when the ore is sensibly heavier than the foreign matters. But the contrary happens frequently, as well because quartz and spar are naturally very ponderous, as because the metallic matter is proportionally so much lighter as it is combined with more sulphur.

When an ore happens to be of this kind it is necessary to begin by roasting it, in order to deprive it of the greatest part of its sulphur.

It happens frequently that the pyritous matters accompanying the ore are so hard that they can scarcely be pounded. In this case it is necessary to roast it entirely, or partly, and to throw it red-hot into cold water; by which the stones are split, and rendered much more capable of being pulverised. Thus it happens very frequently that roasting is the first operation to which an ore is exposed.

When the substance of the ore is very fusible, this first operation may be dispensed with, and the matter may be immediately fused without any previous roasting, or at least with a very slight one. For, to effect this fusion, it is necessary that it retain a great quantity of its sulphur, which, with the other fluxes added, serves to destroy or convert into scoria a considerable part of the stony matter of the mineral, and to reduce the rest into a brittle substance, which is called the matt of lead or of copper, or other metal contained in the ore. This matt is therefore an intermediate matter betwixt the mineral and the metal; for the metal is there concentrated, and mixed with less useless matter than it was in the ore. But as this matt is always sulphureous, the metal which it contains cannot have its metallic properties. Therefore it must be roasted several times to evaporate the sulphur, before it is remelted, when the pure metal is required. This fusion of an ore not roasted, or but slightly roasted, is called crude fusion.

We may here observe upon the subject of washing and roasting of ores, that as arsenic is heavier than sulphur, and has nearly the weight of metals, the ores in which it prevails are generally very heavy, and consequently are susceptible of being washed; which is a great advantage. But, on the other side, as arsenic is capable of volatilising, scorifying, and destroying many metals, these ores have disadvantages in the roasting and fusion, in both which considerable loss is caused by the arsenic. Some ores contain, besides arsenic, other volatile semi-metals, such as antimony and zinc. These are almost untractable, and are therefore neglected. They are called mineræ rapaces, "rapacious ores."

When the metal has been freed as much as is possible from foreign matters by these preliminary operations, it is to be completely purified by fusions more or less frequently repeated; in which proper additions are made, either to absorb the rest of the sulphur and arsenic, or to complete the vitrification or scorification of the unmetallic stones and earth.

Lastly, as ores frequently contain several different metals, these are to be separated from each other by processes suited to the properties of these metals; of which we shall speak more particularly as we proceed in our examination of the ores of each metal.

To facilitate the extraction of metallic substances from the ores and minerals containing them, some operations previous to the fusion or smelting of these ores and minerals are generally necessary. These operations consist of, 1. The separation of the ores and metallic matters from the adhering unmetallic earths and stones, by hammers and other mechanical instruments, and by washing with water. 2. Their division or reduction into smaller parts by contusion and trituration, that by another washing with water they may be more perfectly cleansed from extraneous matters, and rendered fitter for the subsequent operations, calcination or roasting, and fusion. 3. Roasting or calcination; the uses of which operation are, to expel the volatile, useless, or noxious substances, as water, vitriolic acid, sulphur, and arsenic; to render the ore more friable, and fitter for the subsequent contusion and fusion; and, lastly, to calcine and destroy the viler metals, for instance the iron of copper ores, by means of the fire, and of the sulphur and arsenic. Stones, as quartz and flints, containing metallic veins or particles, are frequently made red-hot, and then extinguished in cold water, that they may be rendered sufficiently friable and pulverable, to allow the separation of the metallic particles.

Roasting is unnecessary for native metals; for some of the richer gold and silver ores; for some lead-ores, the sulphur of which may be separated during the fusion; and for many calciform ores, as these do not generally contain any sulphur and arsenic.

In the roasting of ores the following attentions must be given: 1. To reduce the mineral previously into small lumps, that the surface may be increased; but they must not be so small, nor placed so compactly, as to prevent the passage of the air and flame. 2. The larger pieces must be placed at the bottom of the pile, where the greatest heat is. 3. The heat must be gradually applied, that the sulphur may not be melted, which would greatly retard its expulsion; and that the spars, fluors, and stones intermixed with the ore, may not crack, fly, and be dispersed. 4. The ores not thoroughly roasted by one operation must be exposed to a second. 5. The fire may be increased towards the end, that the noxious matters more strongly adhering may be expelled. 6. Fuel which yields much flame, as wood and fossil coals free from sulphur, is said to be preferable to charcoal or coaks. Sometimes cold water is thrown on the calcined ore at the end of the operation, while the ore is yet hot, to render it more friable.

No general rule can be given concerning the duration or degree of the fire, these being very various, according to the difference of the ores. A roasting during a few hours or days is sufficient for many ores; while some, such as the ore of Ramelsberg, require that it should be continued during several months.

Schlutter enumerates five methods of roasting ores. 1. By constructing a pile of ores and fuel placed in alternate strata, in the open air, without any furnace. 2. By confining such a pile within walls, but without a roof. 3. By placing the pile under a roof, without lateral walls. 4. By placing the pile in a furnace consisting of walls and a roof. 5. By roasting the ore in a reverberatory furnace, in which it must be continually stirred with an iron rod.

Several kinds of fusions of ores may be distinguished. 1. When a sulphureous ore is mixed with much earthy matter, from which it cannot be easily separated by mechanical operations, it is frequently melted, in order to disengage it from these earthy matters, and to concentrate its metallic contents. By this fusion some of the sulphur is dissipated, and the ore is reduced to a state intermediate betwixt that of ore and of metal. It is then called a matt *(lapis sulphureo metallicus)*; and is to be afterwards treated like a pure ore by the second kind of fusion, which is properly the smelting, or extraction of the metal by fusion. 2. By this fusion or smelting, the metal is extracted from the ore previously prepared by the above operations, if these be necessary. The ores of some very fusible metals, as of bismuth, may be smelted by applying a heat sufficient only to melt the metals, which are thereby separated from the adhering extraneous matters. This separation of metals by fusion, without the vitrification of extraneous matters, may be called eliquation. Generally, a complete fusion of the ore and vitrification of the earthy matters are necessary for the perfect separation of the contained metals. By this method metals are obtained from their ores, sometimes pure, and sometimes mixed with other metallic substances, from which they must be afterwards separated, as we shall see when we treat of the extraction of particular metals. To procure this separation of metals from ores, these must be so thinly liquefied, that the small metallic particles may disengage themselves from the scoria; but it must not be so thin as to allow the metal to precipitate before it be perfectly disengaged from any adhering extraneous matter, or to pervade and destroy the containing vessels and furnace. Some ores are sufficiently fusible; but others require certain additions called fluxes, to promote their fusion and the vitrification of their unmetallic parts; and also to render the scoria sufficiently thin to allow the separation of the metallic particles.

Different fluxes are suitable to different ores, according to the quality of the ore, and of the matrix, or stone adherent to it.

The matrices of two different ores of the same metal frequently serve as fluxes to each other;

as, for instance, an argillaceous matrix with one that is calcareous; these two earths being disposed to vitrification when mixed, though each of them is singly unfusible. For this reason, two or more different ores to be smelted are frequently mixed together.

The ores also of different metals require different fluxes. Thus calcareous earth is found to be best suited to iron ores, and sand, fusible stones, fusible ores of copper.

The fluxes most frequently employed in the smelting of ores are, calcareous earths, fluors or vitreous spars, quartz, and sand, fusible stones, as slates, basaltes, the several kinds of scoria, and pyrites.

Calcareous earth is used to facilitate the fusion of ores of iron, and of some of the poorer ores of copper, and, in general, of ores mixed with argillaceous earths, or with feltspar. This earth has been sometimes added with a view of separating the sulphur, to which it very readily unites: but by this union the sulphur is detained, and a hepar is formed, which readily dissolves iron and other metals, and so firmly adheres to them, that they cannot be separated without more difficulty than they could from the original ore. This addition is therefore not to be made till the sulphur be previously well expelled.

Fluors or fusible spars facilitate the fusion of most metallic minerals, and also of calcareous and argillaceous earths, of steatites, asbestus, and some other unfusible stones, but not of siliceous earths without a mixture of calcareous earth.

Quartz is sometimes added in the fusion of ferruginous copper ores, the use of which is said chiefly to be, to enable the ore to receive a greater heat, and to give a more perfect vitrification to the ferruginous scoria.

The fusible stones, as slates, basaltes, are so tenacious and thick when fused that they cannot be considered properly as fluxes, but as matters added to lessen the too great liquidity of some very fusible minerals.

The scoria obtained in the fusion of an ore is frequently useful to facilitate the fusion of an ore of the same metal, and sometimes even ores of other metals.

Sulphurated pyrites greatly promote the fusibility of the scoria of metals from the snlphur it contains. It is chiefly added to difficultly-fusible copper ores, to form the sulphureous compounds called matts, that the ores thus brought into fusion may be separated from the adhering earthy matters, and that the ferruginous matter contained in them may be destroyed, during the subsequent calcination and fusion, by means of the sulphur.

As in the ores called calciform the metallic matter exists in a calcined state; and as calcination reduces the metals of mineralised ores (excepting the perfect metals) to that state also: therefore all calciform and calcined ores require the addition of some inflammable substance to reduce them to a metallic state. In great works, the charcoal or other fuel used to maintain the fire produces also this effect.

Metals are sometimes added in the fusion of ores of other more valuable metals, to absorb from these sulphur or arsenic. Thus iron is added to sulphurated, cupreous, and silver ores.

Metals are also added in the fusionof ores of other more valuable metals, to unite with and collect the small particles of these dispersed through much earthy matter, and thus to assist their precipitation. With these intentions lead is frequently added to ores and minerals containing gold, silver, or copper.

Ores of metals are also sometimes added to assist the precipitation of more valuable metals. Thus antimony is frequently added to assist the precipitation of gold intermixed with other metallic matters.

Generally speaking, some separate and different process is necessary for the reduction of the different metals: we have here given the common processes alone; and as the peculiar methods may be more conveniently detailed under the heads of the respective metals as they occur, we have noticed them in those articles accordingly.

METAMORPHO'PSIA. (*metamorphopsia*, μεταμορφοψια; from μεταμορφωσις, a change, and οψις sight.) Visus defiguratus. Disfigured vision. It is a defect in vision, by which persons perceive objects changed in their figures. The species are; 1. Metamorphopsia acuta, when objects appear much larger than their size. 2. Metamorphopsia diminuta, when objects appear diminished in size, arising from the same causes as the former. 3. Metamorphopsia mutans, objects seem to be in motion; to the vertiginous and intoxicated persons every thing seems to stagger. 4. Metamorphopsia tortuosa seu flexuosa, when objects appear tortuous or bending. 5. Metamorphopsia inversa, when objects appear inverted. 6. Metamorphopsia imaginaria, is the vision of a thing not present, as may be observed in the delirious and in maniacs. 7. Metamorphopsia from a remaining impression: it happens to those who very attentively examine objects, particularly in a great light, some time after to perceive the impression.

*To* METAMO'RPHOSE. *v. a.* (μεταμορφόω.) To change the form or shape of any thing (*Wotton*).

METAMO'RPHOSIS. (μεταμορφωσις, formed of μετα, change, or removal from one place or state to another, and μορφη, form, or figure, transformation.) The change of a person or thing into another form.

The ancients held two kinds of metamorphoses; the one real, the other apparent. The metamorphosis of Jupiter into a bull, and of Minerva into an old woman, were only apparent. That of Lycaon into a wolf, and of Arachne into a spider, and the like, they say, were of the real kind.

Most of the ancient metamorphoses include some allegorical meaning, relating either to physics or morality. Ovid's Metamorphoses is a collection of histories of such transformations, poetically related. Some authors are of opinion, that a great part of the ancient philosophy is couched under them; and Dr. Hook has made an attempt to unriddle and lay open the hidden meanings of several of them.

METAPHOR. METAPHO'RA. (μεταφορα, translation, or displacing; of μετα, trans, and φερω, I bear, or carry.) In rhetoric, a figure of speech, or a species of trope, whereby a word is transferred from its proper signification to another, different from it, by reason of some similitude between them; or whereby the pre-

per denomination of one thing is applied to another; which other thing is more elegantly explained by this tralatitious or foreign name, than by that which naturally belongs to it. As, when we say, the light of the understanding; to burn with zeal; to float between hope and despair, &c.

The metaphor is the most common of all the figures of speech; and is that usually meant, when we say a thing is spoken figuratively.

The metaphor is a short simile; or, as Cicero calls it, a similitude reduced to a single word; an image being thereby called from its proper subject to give the resemblance of another. An allegory is no more than a continued metaphor.

METAPHOR and ALLEGORY, in poetry.—A metaphor differs from a simile in form only, not in substance: in a simile the two subjects are kept distinct in the expression, as well as in the thought; in a metaphor, the two subjects are kept distinct in the thought only, not in the expression. A hero resembles a lion, and upon that resemblance many similies have been raised by Homer and other poets. But instead of resembling a lion, let us take the aid of the imagination, and feign or figure the hero to be a lion: by that variation the simile is converted into a metaphor; which is carried on by describing all the qualities of a lion that resemble those of the hero. The fundamental pleasure here, that of resemblance, belongs to the thought. An additional pleasure arises from the expression: the poet, by figuring his hero to be a lion, goes on to describe the lion in appearance, but in reality the hero: and his description is peculiarly beautiful, by expressing the virtues and qualities of the hero in new terms, which, properly speaking, belong not to him, but to the lion. This will better be understood by examples. A family connected with a common parent resembles a tree, the trunk and branches of which are connected with a common root: but let us suppose, that a family is figured, not barely to be like a tree, but to be a tree; and then the simile will be converted into a metaphor, in the following manner:

Edward's seven sons, whereof thyself art one,
Were sev'n fair branches, springing from one root;
Some of these branches by the dest'nies cut:
But Thomas, my dear lord, my life, my Glo'ster,
One flourishing branch of his most royal root,
Is hack'd down, and his summer-leaves all faded,
By Envy's hand and Murder's bloody axe.
*Richard II. act.* i. *sc.* 3.

Figuring human life to be a voyage at sea:

There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune:
Omitted, all the voyage of their life
Is bound in shallows and in miseries.
On such a full sea are we now afloat;
And we must take the current when it serves,
Or lose our ventures.
*Julius Cæsar, act* iv. *sc.* 5.

An allegory differs from a metaphor; and a figure of speech differs from both. A metaphor is defined above to be an act of the imagination, figuring one thing to be another. An allegory requires no such operation, nor is one thing figured to be another; it consists in choosing a subject having properties or circumstances resembling those of the principal subject; and the former is described in such a manner as to represent the latter: the subject thus represented is kept out of view; we are left to discover it by reflection, and we are pleased with the discovery because it is our own work. See ALLEGORY.

Quintilian gives the following instance of an allegory:

O navis, referent in mare te novi
Fluctus. O quid agis? fortiter occupa portum.
*Horat. lib.* i. *ode* 14.

and explains it elegantly in the following words: "Totusque ille Horatii locus quo navim pro republica, fluctuum tempestates pro bellis civilibus, portum pro pace atque concordia, dicit."

In a figure of speech, there is no fiction of the imagination employed, as in a metaphor; nor a representative subject introduced, as in an allegory. This figure, as its name implies, regards the expression only, not the thought; and it may be defined, the using a word in a sense different from what is proper to it.—Thus youth, or the beginning of life, is expressed figuratively by morning of life; morning is the beginning of the day; and in that view it is employed to signify the beginning of any other series, life especially, the progress of which is reckoned by days. See FIGURE OF SPEECH.

Metaphor and allegory are so much connected that it seemed proper to consider them together: the rules particularly for distinguishing the good from the bad, are common to both.

With regard to allegory, nothing gives greater pleasure than this figure when the representative subject bears a strong analogy, in all its circumstances, to that which is represented: but the choice is seldom so lucky; the analogy being generally so faint and obscure as to puzzle, and not please. An allegory is still more difficult in painting than in poetry: the former can show no resemblance but what appears to the eye; the latter hath many other resources for showing the resemblance. And therefore, with respect to what the Abbé du Bos terms mixt allegorical compositions, these may do in poetry; because, in writing, the allegory can easily be distinguished from the historical part: no person, for example, mistakes Virgil's Fame for a real being. But such a mixture in a picture is intolerable; because in a picture the objects must appear all of the same kind, wholly real or wholly emblematical. For this reason the history of Mary de Medicis, in the palace of Luxembourg, painted by Rubens, is unpleasant by a perpetual jumble of real and allegorical personages, which produce a discordance of parts, and an obscurity upon the whole: witness, in particular, the tablature re-

presenting the arrival of Mary de Medicis at Marseilles; where, together with the real personages, the Nereids and Tritons appear sounding their shells: such a mixture of fiction and reality in the same group is strangely absurd. The picture of Alexander and Roxana, described by Lucian, is gay and fanciful; but it suffers by the allegorical figures.

In an allegory, as well as in a metaphor, terms ought to be chosen that properly and literally are applicable to the representative subject: nor ought any circumstance to be added that is not proper to the representative subject, however justly it may be applicable properly or figuratively to the principal. The following allegory is therefore faulty:

> ······. ferus et Cupido,
> Semper ardentes acuens sagittas
> Cote *cruentâ*.
> *Horat. lib.* ii. *ode* 8.

For though the blood may suggest the cruelty of love, it is an improper or immaterial circumstance in the representative subject: water, not blood, is proper for a whetstone.

A metaphor, like a simile, is excluded from common conversation, and from the description of ordinary incidents. Second, in expressing any severe passion that totally occupies the mind, metaphor is unnatural.

The following example of deep despair, beside the highly figurative style, has more the air of raving than of sense:

> *Calista.* Is it the voice of thunder, or my father?
> Madness! confusion! let the storm come on,
> Let the tumultuous roar drive all upon me,
> Dash my devoted bark; ye surges, break it;
> 'Tis for my ruin that the tempest rises.
> When I am lost, sunk to the bottom low,
> Peace shall return, and all be calm again.
> *Fair Penitent, act* v.

The following metaphor is sweet and lively, but it suits not the fiery temper of Chamont, inflamed with passion; parables are not the language of wrath venting itself without restraint:

> *Chamont.* You took her up a little tender flow'r,
> Just sprouted on a bank, which the next frost
> Had nipp'd; and, with a careful loving hand,
> Transplanted her into your own fair garden,
> Where the sun always shines: there long she flourish'd,
> Grew sweet to sense, and lovely to the eye;
> Till at the last a cruel spoiler came,
> Cropp'd this fair rose, and rifled all its sweetness,
> Then cast it like a loathsome weed away.
> *Orph. act* iv.

There is an enchanting picture of deep distress in Macbeth, where Macduff is represented lamenting his wife and children inhumanly murdered by the tyrant. Stung to the heart with the news, he questions the messenger over and over; not that he doubted the fact, but that his heart revolted against so cruel a misfortune. After struggling some time with his grief, he turns from his wife and children to their savage butcher; and then gives vent to his resentment, but still with manliness and dignity:

> O, I could play the woman with mine eyes,
> And braggart with my tongue. But, gentle Heav'n!
> Cut short all intermission; front to front
> Bring thou this fiend of Scotland and myself;
> Within my sword's length set him.—If he 'scape,
> Then Heav'n forgive him too!

Metaphorical expression, indeed, may sometimes be used with grace where a regular simile would be intolerable: but there are situations so severe and dispiriting as not to admit even the slightest metaphor. It requires great delicacy of taste to determine with firmness whether the present case be of that nature: perhaps it is; yet who could wish a single word of this admirable scene altered? See GRIEF.

METAPHO'RICAL. METAPHO'RIC. *a.* (*metaphorique*, French.) Not literal; not according to the primitive meaning of the word; figurative (*Hooker*).

METAPHRA'SE. *s.* (μετάφρασις.) A mere verbal translation from one language into another (*Dryden*).

METAPHRA'ST. *s.* (μεταφράστης.) A literal translator; one who translates word for word from one language into another.

METAPHY'SICAL. METAPHY'SIC. *a.* 1. Versed in metaphysics; relating to metaphysics. 2. In Shakspeare it means supernatural or preternatural.

METAPHYSICS, METAPHYSICA, transnaturalis; a branch of science, about whose nature and idea there is some difference among authors.

The word is formed from the preposition μετα, *trans*, beyond or above; and φυσις, nature, or φυσικη, natural.

Some define metaphysics that part of science which considers spirits and immaterial beings; which others choose to distinguish by the name of pneumatics.

Others, keeping closer to the etymology of the word, explain metaphysics by trans-natural, or præter-natural, or even post-natural philosophy: because it is subsequent in contemplation to the physical, though prior to it in the real order of beings.

Others, with more propriety, conceive metaphysics to be what some others call ontology, or ontosophy, i. e. the doctrine *de ente*, or of being, *quatenus* being.

In the same view, some philosophers call this science by the name *philosophia*, or *scientia generalis*, as being the foundation, or, as it were, the stamen or root from whence all the other parts of philosophy arise, and wherein they all meet; its object being *being* in the abstract, or general, not restrained to this or that species of beings; not to spirit any more than body: so that the doctrines of metaphysics are applicable to all beings whatever.

Philosophers, again, are divided as to the notion of a science *de ente* in general. Some hold it real, precise, and solid enough to be demonstrated; but others judge it too obscure, faint, and confused, to be admitted into philosophy.

Being, abstracted from every sort or species of being, is certainly a very vague term, and does not seem to give scope enough for a science: we do not see how it can affect the mind as an object. Add, that the common metaphysics cannot demonstrate any part of its subject, but assume the whole: there are no principles or axioms whereon to demonstrate metaphysics, which contain the principles of all other sciences.

The first who wrote professedly on the subject of metaphysics is Aristotle. Indeed, he is the first who uses the word: μεταφυσικα, is the title of one of his books; but this some of his commentators will have to signify no more than after the books of physics. M. du Hamel, taking the preposition μετα in the sense of post, is even of opinion that the word was coined by Aristotle's followers; and that it was unknown to Aristotle himself.

Aristotle's metaphysics seem to have been intended for a kind of natural theology. The metaphysics of Aristotle have been lately illustrated by the ingenious Mr. Harris, in his treatise, entitled Philosophical Arrangements, 8vo. 1775. F. Malebranche and Mr. Locke have written much more clearly and consistently of metaphysics than any of the ancients. Other excellent metaphysical writers, though according to different systems, are Berkeley, Watts, Andrew Baxter, Hartley, Reid, Beattie, and Dugald Stewart. The last mentioned ingenious author's Elements of the Philosophy of the Human Mind are very valuable, as are also his Essays, recently published. To the first of these works we can cheerfully refer those who wish to advance beyond the surface of this interesting subject.

METAPLASM. *s.* (μεταπλασμὸς.) A figure in rhetoric, wherein words or letters are transposed contrary to their natural order.

METAPONTUM, a town of Lucania in Italy, founded about 1269 years B. C. by Metabus, the father of Camilla or Epeus, one of the companions of Nestor. Pythagoras retired there for some time, and perished in a sedition.

METASTASIO (Pietro), an eminent Italian poet, was born at Rome of poor parents, in 1678. He embraced the ecclesiastical state, and his poems procured him the gift of nobility from the city of Assisi. The emperor Charles VI. appointed him poet-laureat. He died at Vienna in 1782. Metastasio wrote 26 operas, eight oratorios, besides numerous other pieces. His sonnets are very beautiful.

The greatest part of Metastasio's writings will confer immortality on their author. His dialogue is natural, simple, and easy; his style is always pure and elegant, and sometimes sublime and pathetic. His subjects are noble, interesting, and excellently adapted for representation. He was perfectly acquainted with the resources of his art, and has subjected the opera to rules. He stripped it of its machinery, and of the marvellous, which was fitted to excite the gaze of astonishment, but which gave no instruction to the understanding, and made no impression on the heart. His descriptions are copied from nature; the situations of his characters never fail to raise an interest in the reader, and often excite the tear of pity. His fables are celebrated; his characters are noble and well supported; his plots are excellently conducted, and happily unravelled. "There are scenes (says Voltaire) worthy of Corneille when he does not declaim, and of Racine when he is not feeble." His operas in point of the pathetic may be compared with our finest tragedies; and may be read with great pleasure, independent of the charms of the music. We must not, however, expect to find in Metastasio that exact regularity, and that fertile simplicity, which constitutes the excellence of some of our tragic poets: but though he sometimes transgresses the unities of time and place, he always preserves the unity of interest. Notwithstanding all these advantages, however, some critics will not allow him the merit of invention, which is the first qualification of a poet.

METASTASIS. (*metastasis*, μεταστασις; from μεθιστημι, to change, to translate.) The removal of a disease from one place to another.

METATARSAL BONES. The five longitudinal bones between the tarsus and toes; they are distinguished into the metatarsal bone of the great toe, fore toe, &c.

METATARSUS. (*metatarsus*, μετταρσιος; from μετα, after, and ταρσος, the tarsus.) That part of the foot between the tarsus and toes.

META'THESIS. *s.* (μεταθεσις.) A transposition.

*To* METE. *v. a.* (*metior*, Latin.) To measure; to reduce to measure (*Creech*).

METELIN. See LESBOS and MITYLENE.

METELLA NUX. See NUX VOMICA.

METELLI (Augustino), an Italian painter, born at Bologna in 1609. He excelled in painting perspective and architecture; and, in conjunction with Michael Angelo Colonna, produced several great works. They were both employed by Philip IV. of Spain. Metelli died at Madrid in 1660.

METELLUS (Q. Cæcilius), an illustrious Roman, who distinguished himself by his successes against Jugurtha the Numidian king, and from thence acquired the name of Numidicus. He had for his lieutenant in this expedition the famous Marius, who raised himself to power by defaming the character of Metellus; in consequence of which the latter was recalled. However, he so well cleared himself that he was acquitted of the charges brought against him. There were several Romans of the same name.

*To* METEMPSYCHO'SE. *v. a.* (from *metempsychosis*.) To translate from body to body (*Peacham*).

METEMPSYCHOSIS (formed of μετα, beyond, and εμψυχω, I animate or enliven) In the ancient philosophy, the passage or transmigration of the soul of a man, after death, into the body of some other animal. Pythagoras and his followers held, that after death men's souls passed into other bodies, of this or that kind, according to the manner of life they had led. If they had been vicious, they were imprisoned in the bodies of miserable beasts, there to do penance for several ages; at the expiration whereof they returned afresh to animate men. But, if they lived virtuously, some happier brute, or even a human creature, was to be their lot.

What led Pythagoras into this opinion was, the persuasion he had that the soul was not of a perishable nature: whence he concluded that it must remove into some other body upon its abandoning this. Lucan treats this doctrine as a kind of officious lie, contrived to mitigate the apprehension of death, by persuading men that they only changed their lodging, and only ceased to live to begin a new life.

Pythagoras is said to have borrowed the notion of a metempsychosis from the Egyptians; others say, from the ancient Brachmans. It is still retained among the Banians and other idolaters of India and China; and makes the principal foundation of their religion. So extremely are they bigoted to it, that they not only forbear eating any thing that has life, but many of them even refuse to defend themselves from wild beasts. They burn no wood, lest some little animalcule should be in it; and are so very charitable, that they will redeem from the hands of strangers any animals that they find ready to be killed. See PYTHAGOREANS.

METEMPTOSIS. (from μετα, *post*, and πιπτω, *cado*, I fall.) A term in chronology, expressing the solar equation, necessary to prevent the new moon from happening a day too late. By which it stands contradistinguished from proemptosis, which signifies the lunar equation, necessary to prevent the new moon from happening a day too soon.

The new moons running a little backwards, that is, coming a day too soon at the end of 312 years and a half; by the proemptosis, a day is added every 300 years, and another every 2400 years: on the other hand, by the metemptosis, a bissextile is suppressed each 134 years; that is, three times in 400 years. These alterations are never made but at the end of each century; that period being very remarkable, and rendering the practice of the calendar easy.

METEOR. *s.* (μετέωρα.) Any body in the air or sky that is of a flux and transitory nature. This term is by some writers made to comprehend all the visible phenomena of meteorology, but it is more generally confined to luminous bodies appearing suddenly at uncertain times, and with more or less of motion in the atmosphere. These may be reduced under three classes, viz. fireballs, falling or shooting stars, and *ignes fatui.*

Those phenomena which are classed together under the general appellation of fire-balls were divided by the ancients into several species, according to the external form or appearance which they assumed. They were also regarded by them in a much more formidable light than by us; as being the certain prognostics of great and awful events in the moral and political world. Even the philosophic Cicero himself speaks of the *ab occidente faces*, as the certain harbingers or indications of those bloody scenes which in his time convulsed and desolated the Roman commonwealth.

Under the general name of comets, Pliny enumerates a variety of these phenomena. If the fire commences at one extremity of the meteor, and burns by degrees, he terms it, from its form and appearance, a lamp or torch; if an extended mass of fire passes longitudinally through the atmosphere, he calls it a dart; and if its length and magnitude are considerable, and it maintains its station for any space of time, it is a beam; and if the clouds seem to part and emit a quantity of fire, he terms it a chasm; but this last appears to be, strictly speaking, an electrical phenomenon, indeed only a strong and vivid flash of lightning.

Several instances of these meteors are recorded by the same author. During the spectacle of gladiators exhibited by Germanicus, one of them passed rapidly by the faces of the spectators at noon-day. A meteor of that species which he calls a beam, he adds, was seen when the Lacedemonians were defeated at sea, in that memorable engagement which lost them the empire at sea. He also mentions a sanguineous kind of meteor, a flame as red as blood, which fell from heaven about the 107th Olympiad, when Philip of Macedon was concerting his wicked plan for enslaving the republics of Greece. He relates, that when he was himself on the watch during the night in the Roman camp, he was a spectator of a similar appearance—a number of resplendent lights fixed upon the palisadoes of the camp, similar, he says, to those which mariners speak of as attaching themselves to the masts and yards of a ship.

In tropical climates these meteors are more common and more stupendous than in these more temperate regions. "As I was riding in Jamaica," says Mr. Barbham, "one morning from my habitation, situated about three miles north-west from St. Jago de la Vega, I saw a ball of fire appearing to me about the bigness of a bomb, swiftly falling down with a great blaze. At first I thought it fell into the town, but when I came nearer I saw many people gathered together a little to the southward, in the savannah, to whom I rode up to enquire the cause of their meeting: they were admiring, as I found, the ground's being strangely broken up and ploughed by a ball of fire, which, as they said, fell down there. I observed there were many holes in the ground; one in the middle of the bigness of a man's head, and five or six smaller round about it of the bigness of one's fist, and so deep as not to

be fathomed by such implements as were at hand. It was observed also, that all the green herbage was burnt up near the holes; and there continued a strong smell of sulphur near the place for some time after."

Ulloa gives an account of one of a similar kind at Quito. "About nine at night," says he, "a globe of fire appeared to rise from the side of the mountain Pichinca, and so large that it spread a light over all the part of the city facing that mountain. The house where I lodged looking that way, I was surprised with an extraordinary light darting through the crevices of the window-shutters. On this appearance, and the bustle of the people in the street, I hastened to the window, and came time enough to see it in the middle of its career, which continued from west to south, till I lost sight of it, being intercepted by a mountain that lay between me and it. It was round, and its apparent diameter about a foot. I observed it to rise from the sides of Pichinca, although to judge from its course, it was behind that mountain where this congeries of inflammable matter was kindled. In the first half of its visible course it emitted a prodigious effulgence, then it began gradually to grow dim; so that upon its disappearing behind the intervening mountain its light was very faint."

Meteors of this kind are very frequently seen between the tropics; but they sometimes also visit the more temperate regions of Europe. We have the description of a very extraordinary one, given us by Montanari, that serves to shew to what great heights in our atmosphere these vapours are found to ascend. In the year 1676, a great globe of fire was seen at Bononia, in Italy, about three-quarters of an hour after sun-set. It passed westward with a most rapid course, and at the rate of not less than 160 miles in a minute, which is much swifter than the force of a cannon ball, and at last stood over the Adriatic sea. In its course it crossed over all Italy; and, by computation, it could not have been less than 38 miles above the surface of the earth. In the whole line of its course, wherever it approached, the inhabitants below could distinctly hear it, with a hissing noise, resembling that of a firework. Having passed away to sea towards Corsica, it was heard at last to go off with a most violent explosion, much louder than that of a cannon; and immediately after another noise was heard like the rattling of a great cart upon a stony pavement, which was probably nothing more than the echo of the former sound. Its magnitude when at Bononia appeared twice as long as the moon one way, and as broad the other; so that considering its height, it could not have been less than a mile long, and half a mile broad. From the height at which this was seen, and there being no volcano in that quarter of the world whence it came, it is more than probable that this terrible globe was kindled on some part of the contrary side of the globe; and thus rising above the air and passing in a course opposite to that of the earth's motion, in this manner it acquired its amazing rapidity.

Two of these meteors appeared in this country in the year 1783, of which a most particular and truly philosophical account and ingenious solution, by Dr. Blagden, are published in the Philosophical Transactions of the following year. Other meteors of this kind have appeared more recently: but they are within the recollection of most of our readers, and need not be minutely described here. See also FIRE-BALL.

METEORIC IRON, METEORIC STONE, in mineralogy. See FERRUM and ÆROLITH.

METEORIC VIGILS. In botany, when flowers open and shut according to the temperature of the air. See VIGILS.

METEOROLO'GICAL. *a.* (from *meteorology.*) Relating to the doctrine of meteors (*Howel*).

METEORO'LOGIST. *s.* (from *meteorology.*) A man skilled in meteors, or studious of them (*Howel*).

METEOROLOGY, is the science of studying the phenomena of the atmosphere, and the term by which is expressed all the observations that tend to make them a system. There are many most important meteorological phenomena, and those may be classed under five distinct heads; for instance, the alterations that occur in the weight of the atmosphere, those that take place in its temperature, the changes produced in its quantity by evaporation and rain, the excessive agitation to which it is frequently subject, and the phenomena arising from electric and other causes, that at particular times occasion or attend the precipitations and agitations alluded to.

All the above phenomena prove to demonstration that constant changes take place, the consequences of new combinations and decompositions rapidly following each other. The majority of meteorological alterations depend on these chemical changes, and were we accurately acquainted with the peculiarities of the substances which form the component parts of the atmosphere, nothing would be more easy than to explain the result of their mutual action; but as that is unfortunately not the case, we must be contented to build upon strong probabilities supported in many instances by positive experiment.

It is singular that this science should have remained for so long a period in a state of comparative neglect, when it is recollected that almost all the operations necessary for the support of human life, and almost all the comforts of corporeal feeling, depend upon the state of the atmosphere, and yet nothing was attempted to any purpose towards investigating the laws of meteorology till the seventeenth century, when the most important discoveries of the barometer and thermometer occurred, which was followed in the eighteenth by the invention of excellent hygrometers and electrometers; by these the philosopher finds himself competent to make accurate and satisfactory observations. Scientific persons, who have particularly turned their attention to this pursuit, have undertaken the laborious task of collecting and methodically arranging numbers of the observations just mentioned, and after attentively comparing and examining them, have

formed theories of the weather, of more or less probable accuracy; but the science is of such difficulty, that though those theories deserve every praise, we are compelled to acknowledge the phenomena of the weather is still very imperfectly understood. This acknowldgment, however, reflects no discredit on those ingenious men, as it is impossible that any thing like certainty should be attained, till observations that can be depended upon are procured from all parts of the globe, the atmosphere has been more accurately explored, and the chemical changes occuring in it are correctly ascertained.

To render our explanation of this subject as satisfactory as circumstances will permit, we shall proceed in the succession before pointed cut: with respect to the changes in the weight of the atmosphere, it is generally known that the instrument called the barometer shews the weight of a body of air immediately above it extending to the extreme boundary of the atmosphere, and the base of which is equal to that of the mercury contained within it. As the level of the sea is the lowest point of observation, the column of air over a barometer placed at that level is the longest to be obtained; in this case the mean height of the barometer is thirty inches. According to the experiments of sir George Shuckburg in the Channel and the Mediterranean sea in the temperature of 55° and 60°, this was found to be the case, and the result is confirmed by those of M. Bouguer on the coast of Peru in the temperature of 84°, and lord Mulgrave in latitude 80°. From these data, it is evident that the mean height of the barometer decreases in proportion with its elevation above the level of the sea, and in proportion to the consequent shortening of the columns of air; hence it is used for measuring heights. The keeping of a barometer in one particular place does not make the mercury stationary, as it will vary by rising or falling to the extent of several inches, of necessity the weight of the air which balances the mercury must be subject to the same changes; this circumstance proves that the gravity of the air in any given situation varies greatly, being at one time light and another heavy, an effect which must be caused by changes in its quantity, and a fact that demonstrates the air of every place liable to perpetual alterations, which must arise from the accumulation of air in particular places, and a reduction in others, " or " as Dr. Thomson observes, " part of the atmosphere must be alternately abstracted altogether, and restored again by some constant, though apparently irregular process."

The variations of the barometer between the tropics are very trifling, and it is worthy of observation, it does not descend more than half as much in that part of the globe for every two-hundred feet of elevation as it does beyond the tropics, which we learn from the Journal de Physique; besides, the barometer rises about two-thirds of a line twice during each day in the torrid zone. We are informed by M. Horsburgh that from latitude 26° north to latitude 27° south, which includes the space termed the tropical seas, the mercury attained its greatest elevation at eight in the morning, from which hour till noon it continued stationary; it then began to fall, and descended till about four o'clock, when it reached the lowest point of depression. In the interval between four and five the mercury rose, and continued to rise till about nine or ten P.M. when it had once more arrived at its most elevated point, where it remained stationary til[l] near midnight, when it fell and continued to fall, till at four A.M. it had descended as low as it had been at four in the afternoon; from that period till seven or eight it continued rising, and at the latter hour it had attained the highest point of elevation. The gentleman who made these observations termed the elevations and depressions now described equal tropical motions, and asserts, that they were regularly performed while the barometers were on the sea, but they were seldom observed on a river, or when the instruments were on shore. This circumstance leads us to concur with Dr. Thomson, in supposing that the singular fact is to be ascribed to the motion of the ship, " which by regularly agitating the mercury, might make its elevations and depressions more sensible and correct than when the barometer continues stationary." The range of the barometer increases gradually as the latitude advances towards the poles, till in the end it amounts to two or three inches. The following table, composed by the writer just cited, will explain the gradual increase alluded to, which he compiled from the best authorities.

| Latitude | | Places | Range of the barometer | | | |
|---|---|---|---|---|---|---|
| | | | Greatest | | Annual | |
| 0° | 0′ | Peru | 0 | 20 | | — |
| 22 | 23 | Calcutta | 0 | 77 | - | — |
| 33 | 55 | Cape Town | - | — | 0 | 89 |
| 40 | 55 | Naples | 1 | 00 | - | — |
| 51 | 8 | Dover | 2 | 47 | 1 | 80 |
| 53 | 13 | Middlewick | 3 | 00 | 1 | 94 |
| 53 | 23 | Liverpool | 2 | 89 | 1 | 96 |
| 59 | 56 | Petersburgh | 3 | 45 | 2 | 77 |

The range of the barometer is considerably less in North America than in the corresponding latitudes of Europe, particularly in Virginia, where it never exceeds 1.1. The range is more considerable at the level of the sea than on mountains, and in the same degree of latitude it is in the inverse ratio of the height of the place above the level of the sea.

M. Cotte composed a table which has been published in the Journal de Physique, from which it appears extremely probable that the barometer has an invariable tendency to rise between the morning and the evening, and that this impulse is most considerable from two in the afternoon till nine at night, when the greatest elevation is accomplished; but the elevation at nine differs from that at two by four-twelfths, while that of two varies from the elevation of the morning only by one-twelfth, and that in particular climates the greatest elevation is at two o'clock. The observations of M. Cotte confirm those of Mr. Luke Howard, and from them it is concluded that the barometer is influenced by some depressing cause at new and full moon, and that some other makes it rise at the quarters. This coincidence is most considerable in fair and calm weather; the depression in the interval between the quarters and conjunctions amounts to one-tenth of an inch, and the rise from the conjunctions to the quarters is to the same amount.

The range of this instrument is found to be greater in winter than in summer; for instance, the mean at York during the months from October to March inclusive, in the year 1774, was 1.42, and in the six summer months 1.016.

The more serene and settled the weather is the higher the barometer ranges, calm weather with a tendency to rain depresses it, high winds have a similar effect on it, and the greatest elevation occurs with easterly and northerly winds, but the south produces a directly contrary effect. According to the Asiatic Researches it is always observed to be highest with north and north-west winds, and the reverse when the south-east prevails; it falls rapidly previous to violent tempests, and is greatly agitated while they continue. It has been remarked by Mr. Copland in the Transactions of the Society of Manchester, that "a high barometer is attended with a temperature above, and a low barometer with one below, the monthly mean." Various but almost altogether unsuccesful attempts have been made to explain the phenomena we have enumerated; that of Mr. Kirwan carries considerable plausibility, though it is not considered quite satisfactory. In order that his ideas on the subject may be clearly understood, we shall give what may be considered an abstract of his theory, improved by Dr. Thomson. The density of the atmosphere is evidently greatest at the poles, and least at the equator, as the centrifugal force at the latter, the distance from the centre of the earth, and the heat, all contributing to lessen the density of the air, are at their maximum, when at the pole it is exactly the reverse. In every part of the world the mean height of the barometer placed at the level of the sea will be found to be 30 inches, consequently, the weight of the atmosphere is the same in all places; its weight depending on its density and height; where the former is greatest the height must be the least, and where its density is least the height is the greatest. Arguing from these facts it will, therefore, appear that the height of the atmosphere must be least at the poles, and greatest at the equator, decreasing gradually in the interval, and thus forming the resemblance of two inclined planes, meeting at the highest part above the equator.

The difference of the mean heat between the pole and the equator, when the sun is in our hemisphere in the summer, does not vary so much as in the winter, as the heat at that period in northern countries equals that of the torrid zone; hence the thermometer rises to 85° in Russia during the months of July and August, of necessity the rarity of the atmosphere and its height increases; in consequence, the upper part in the northern hemisphere inclines less, but that of the southern, from different causes, must be much more inclined; during our winter the exact reverse takes place.

The pressure of the superincumbent column in a great measure causes the density of the atmosphere, and therefore decreases in proportion to the height as the pressure of the column constantly decreases, yet the density in the torrid zone does not decrease so rapidly as in the temperate and frigid, as the column is longer, and because there is a larger proportion of air in the upper part of it. This fact agrees with the assertion of M. Cassan, "that the barometer only sinks half as much for every two hundred feet of elevation in the torrid, as in the temperate zones." The density at the equator, though less at the surface of the earth, must equal at a certain height, and still higher exceed the density in the temperate zones, and at the poles.

It is ascertained that a current of air constantly ascends at the equator, part at least of which reaches to and remains in the highest parts of the atmosphere; the fluidity of that body prevents it from accumulating above the equator, and hence it must descend the declined plane before mentioned. The surface of the atmosphere being more inclined in the northern hemisphere during our winter than that of the southern, more of the current must flow on the northern than on the southern, from which cause the quantity of our atmosphere is greater in winter than that of the southern hemisphere; in the summer it is just the contrary; consequently the range of the barometer is less in summer than in winter, and the greatest mercurial heights occur during winter.

The heat of any given place in a great measure influences the density of its atmosphere; that density will be most considerable where it is coldest, and its column shortest. Chains of mountains, the summits of which are covered with snow great part of the year, and highlands, must be colder than places less elevated in the same latitude, and the column of air over them much shorter. The current of air above must be impeded and accumulate while on its passage over these places towards the poles, which causing an agitation, it will be communicated to, and indicated by, the barometer in a singular manner. These accumulations occur over the north-west parts of Asia and North America, and this raises the barometer, and causes less variation in it there than in Europe. It is precisely so on the Pyrenees, the Alps, and the mountains in Africa, Turkey in Europe, Tartary, and Tibet. After the accumulations have existed some time the surrounding atmosphere becomes incapable of balancing the density of the air, when it descends with violence, and occasions cold winds, which raise the barometer; it is to this that we are to attribute the rise of the barometer, almost always attending north-east winds in Europe, which is the effect of accumulations near the pole, or in the north-west parts of Asia; it is thus besides that the north-west wind from the mountains of Tibet raises the barometer at Calcutta. It may be supposed that in the polar regions large quantities of air are casually compressed; when this is the case the southern atmosphere must rush in to replace it, which occasions south-west gales and the fall of the barometer.

The mean heat of our hemisphere varying in successive years, the density of the atmosphere, and necessarily, the quantity of equatorical air passing towards the poles, cannot be otherwise than variable, hence occurs the different ranges of the barometer in successive years; at some particular periods, more considerable accumulations take place in the highest parts of Asia, and the south of Europe, than at others, which may be produced by early falls of snow, or the interruption of the sun's rays by long continued fogs; at such times the atmosphere in the polar regions becomes proportionably lighter, and this causes the prevalence of southerly winds in some winters more than in others. The heat of the torrid zone never greatly varying, the height and density of the atmosphere undergoes but few changes, thence arises the comparatively small range of the barometer within the tropics, which gradually increases towards the poles as the difference of the temperature, and the density of the atmosphere increases with the latitude. The sinking of the barometer preceding violent tempests,

and the oscillations during their continuance, prove that very great rarefactions, or even destruction of air, in some part of the atmosphere produce those phenomena; the falls too that accompany winds arise from the same cause. Unfortunately we are but little acquainted with the operations which produce rain, consequently we are unable to explain satisfactorily why the barometer falls immediately preceding it.

The most inattentive observer of the phenomena of nature must have noticed that there are considerable variations in the temperature of the air in any particular place, exclusive of the differences of seasons and climates, which eternal changes cannot be produced by heat derived from the sun, as its rays concentrated have no kind of effect on air, those however heat the surface of our globe, which is communicated to the immediate atmosphere; it is through this fact that the temperature is highest where the place is so situated as to receive with most effect the rays of the sun, and that it varies in each region with the season; it is also the cause why it decreases in proportion to the height of the air above the surface of the earth. The most perpendicular rays falling on the globe at the equator, there the heat of it is the greatest, and that heat decreases gradually to the poles, of course the temperature of the air is in exact unison; from this it appears, that the air acquires the greatest degree of warmth over the equator, whence it becomes insensibly cooler till we arrive at the poles; in the same manner, the air immediately above the equator cools gradually. Though the temperature sinks as it approaches the pole, and is highest at the equator, yet as it varies continually with the seasons, it is impossible to form an accurate idea of the progression without forming a mean temperature for a year, from that of the temperature of every degree of latitude for every day of the year, which may be accomplished by adding together the whole of the observations, and dividing by their number, when the quotient will be the mean temperature for the year. "The diminution," says Dr. Thomson, "from the pole to the equator takes place in arithmetical progression; or to speak more properly, the annual temperature of all the latitudes are arithmetical means between the mean annual temperature of the equator and the pole." Mr. Mayer has the honour of this discovery, but Mr. Kirwan rendered it more simple and plain, by founding an equation on it, by which he calculated the annual mean temperature of every degree of latitude between the equator and the pole; the following was the principle of proceeding. "Let the mean annual heat at the equator be $m$, and at the pole $m - n$; put $\Phi$ for any other latitude; the mean annual temperature of that latitude will be $m - n \times \sin. \Phi^2$. If therefore the temperature of any two latitudes be known, the value of $m$ and $n$ may be found. Now the temperature of north lat. 40° has been found by the best observation to be 62.1°, and that of lat. 50°, 52.9°. The square of the sine of 40° is nearly 0.49, and the square of the sine of 50° is nearly 0.586. Therefore,

$$m - 0.41\,n = 62.1, \text{ and}$$
$$m - 0.58\,n = 52.9, \text{ therefore}$$

$62.1 + 0.41\,n = 52.9 + 0.58\,n$ as each of them from the two equations is equal to $m$. From this last equation the value of $n$ is found to be 53 nearly; and $m$ is nearly equal to 84. The mean temperature of the equator, therefore, is 84°, and that of the pole 31°. To find the mean temperature for every other latitude, we have only to find 88 arithmetical means between 84 and 31."

Mr. Kirwan calculated a table of the mean annual temperature of the standard situation in every latitude, which answers only for those of the atmosphere of the ocean, as it was made for that part of the Atlantic situated between 80° north and 45° south latitude, extending westward to the gulf stream, within a few leagues of the American coast; and for all that part of the Pacific Ocean from the 45th degree of northern to the 40th of southern latitude, from the 20th to the 275th degree of longitude east of London. Mr. Kirwan terms this part of the ocean the standard, as the rest is subject to anomalies to be mentioned hereafter. The same industrious gentleman ascertained the monthly mean temperature of the standard ocean; that of April approaches very nearly to the annual mean, and as far as heat depends on the action of solar rays, that of each month is as the mean altitude of the sun, or rather as the sine of the sun's altitude. The learned investigators to whom we are indebted for these experiments and observations, say, "As the sine of the sun's mean altitude in April is to the mean heat of April, so is the sine of the sun's mean altitude in May to the mean heat of May. In the same manner the mean heats of June, July, and August, are found; but the rule would give the temperature of the succeeding months too low, because it does not take in the heat derived from the earth, which possesses a degree of heat, nearly equal to the mean annual temperature. The real temperature of these months, therefore, must be looked upon as an arithmetical mean between the astronomical and terrestrial heats. Thus in latitude 51°, the astronomical heat of the month of September is 44.6°, and the mean annual heat is 52.4°; therefore the real heat of this month should be $\frac{44.6 + 52.4}{2} = 48.5$.

After many laborious calculations Mr. Kirwan had the mortification to find their results differed so much from observations, that he was induced to make a table from various sea journals, and certain principles for the monthly mean temperature of the standard, from lat. 80° to lat. 10°, from which he decides that the coldest month in every latitude is January, and that July is the warmest in all above 48°, in lower August. In proportion to the distances from the equator is the increase and decrease of heat, but every latitude where existence can be maintained has a mean of 60° two months of the year at the least, which is requisite for the production of those articles by which man supports life. The temperature within ten degrees of the poles vary little, and the case is similar within the same distance from the equator; those of different years near the latter differ very little, but the differences increase as the latitudes approach the poles. It is well known that the temperature of the atmosphere diminishes gradually in proportion to its height above the level of the sea. The late Dr. Hutton of Edinburgh made some experiments on this head by placing a thermometer on the summit of Arthur's Seat, a hill so named, and another at the base of it, by which he found that the former generally stood at three degrees lower than the latter; in this instance therefore a height estimated at 800 feet produced a diminution of heat amounting to three degrees. Bouguer made a similar experiment to ascertain

the difference of temperature between the level of the sea and the top of Pinchinca, one of the Andes, when the thermometer at the summit stood at 30° and that below in the same latitude at 84°; the diminution was 54° in a supposed height of 15,564 feet. Thus far the operation is easy and practicable, but the grand difficulty lies in determining the exact gradations between the highest and lowest points of observation: conjectures on this subject have been hazarded by Euler and Saussure; the first gives it in harmonic progression; and Saussure supposed the decrease of temperature to amount to 1° for 287 feet of ascent. Mr. Kirwan, however, rejecting those improbabilities, shews in the Transactions of the Royal Irish Academy, that the rate of diminution depends upon the precise temperature of the surface of the earth where an experiment is made; he has besides invented an ingenious mode of ascertaining the rate in every instance, admitting the temperature at the surface to be known.

This gradual approach to cold demonstrates that at a certain height eternal congelation must prevail; that height varies of course according to the latitude of the place, being highest at the equator, and gradually descending on approaching the poles; it is also lower in the winter. The cold on the summit of Pinchinca was found, by M. Bouguer, to extend from seven to nine degrees every morning previous to the rising of the sun below the freezing point, from which he conjectured, that the mean height of the term of congelation (or that region where water congeals on some part of every day in the year) between the tropics, is 15,577 feet above the level of the sea; in latitude 28°, he supposes it to be 13,440 during summer; taking "the difference between the freezing point and the equator, it plainly appears, that it bears the same proportion to the term of congelation at the equator that the difference between the mean temperature of any other degree of latitude, and the freezing point, bears to the term of congelation in that latitude." "Thus," continues Dr. Thomson, "the mean heat of the equator being 84°, the difference between it and 32 is 52; the mean heat of latitude 28° is 72.3°, the difference between which and 32 is 40.3. Then 52 : 15,577 : : 40.3 : 12072." Mr. Kirwan calculated another table on this subject, from latitude 0, where he makes the mean height of the term of congelation 15,577, by gradations of five degrees up to latitude 80—120 feet; higher than this, called the lower term of congelation, which varies with circumstances and seasons, M. Bouguer places another, called by him the upper term, and beyond this no visible vapour ascends. The former gentleman supposes this line far less liable to variation in the summer than the lower term, and therefore adopted it to ascertain the rate of diminution of heat on ascending into the atmosphere. Bouguer determined the height of this term in one instance, but Kirwan went further, and produced a table of its height for every degree of latitude in the northern hemisphere. We shall quote Mr. Kirwan's rule for obtaining the temperature at any given height, admitting that the temperature at the surface of the earth is known. "Let the observed temperature at the surface of the earth be $= m$, the height given $= h$, and the height of congelation for the given latitude be $=$ $t$; then $\dfrac{m-32}{\dfrac{t}{100}-1} =$ the diminution of temperature for every 100 feet of elevation; or it is the common difference of the terms of the progression required. Let this common difference thus found be denoted by $c$, then $c \times \dfrac{h}{100}$ gives us the whole diminution of temperature from the surface of the earth to the given height. Let this diminution be denoted by $d$, then $m-d$ is obviously the temperature required. An example will make this rule sufficiently obvious. In latitude 56° the heat of below being 54°, required the temperature of the air at the height of 803 feet.

Here $m = 54$, $t = 5{,}533$, $\dfrac{m \quad 32}{\dfrac{t}{100}-11} = \dfrac{22}{54.33} =$ $0.404 = c$, and $c \times \dfrac{h}{100} = 0.404 \times 8.03 = 3.24$ $= d$, and $m- = 54 - 3.24 = 50.75$: here we see that the temperature of the air 803 feet above the surface of the earth is 50° 75″.

Estimating the diminution from this method, which corresponds with observation, we find that heat lessens in an arithmetical progression; and from the same premises it may be concluded, that the warmth of the air at some distance from the earth is not to be attributed to the rising of heated strata of air from the earth's surface, but to the conducting power of the air.

The upper strata of the atmosphere are frequently warmer in winter than the lower, and the preceding rule is applicable to the temperature of the air during the summer months only. According to the Philosophical Transactions for 1777, a thermometer placed on the summit of Arthur's Seat, the thirty-first of January, the year before, stood six degrees higher than a second at Hawkhill, situated 684 feet below it: this superior heat is considered by Mr. Kirwan to be produced by a current of heated air flowing from the equator towards the north pole during our winter. A general idea has now been given of the method by which the mean annual temperature may be found throughout the known regions of the globe; but there are some exceptions to the universality of the rules: for instance, the Pacific Ocean, between latitude 52° and 66° north, and at the northern extremity, is only 42 miles in breadth, and at its southern is 1300 miles; it is therefore but reasonable to suppose, that the temperature must be greatly affected by the land surrounding it, which rises into chains of mountains, with summits bearing snow great part of the year, exclusive of the islands consisting of high lands scattered within it. Mr. Kirwan concludes, in consequence, that its temperature is four or five degrees below the standard; this supposition cannot, however, be brought to any degree of certainty, from a deficiency of observations. It has been a generally received opinion that the southern hemisphere, beyond the fortieth degree of latitude, is much colder than corresponding parts of the northern: this our philosopher has proved to be true with respect to the summer of the former; but that the winter in the same latitude is milder than in the latter. See CLIMATE.

Inconsiderable seas, in temperate and cold climates, are colder in winter and warmer in summer than the standard ocean, as they are necessarily under the influence of natural operations from the land, and its temperature, particularly the Gulph of Bothnia, which is generally frozen in the winter, but the water is sometimes heated in

the summer to 70°, a state the opposite part of the Atlantic never acquires; the German Sea is five degrees warmer in summer than the Atlantic, and more than three colder in winter; the Mediterranean is almost throughout warmer both in winter and summer, which therefore causes the Atlantic to flow into it; and the Black Sea being colder than the Mediterranean, flows into the latter.

It appears from meteorological tables, that the eastern part of North America has a much colder air than the opposite European coast, and falls short of the standard by about ten or twelve degrees. There are several causes which produce this considerable difference. The greatest elevation in North America is between the 40th and 50th degree of north latitude, and the 100th and 110th of longitude west from London, and there the most considerable rivers have their origin. The height alone is sufficient to make this tract colder than it would otherwise be; but there are other causes, and those are most extensive forests, and large swamps and morasses, each of which exclude heat from the earth, and consequently prevent it from ameliorating the rigour of winter. Many extensive lakes lie to the east, and Hudson's Bay more to the north; a chain of mountains extend on the south of the latter, and those equally prevent the accumulation of heat; besides, this bay is bounded on the east by the mountainous country of Labrador, and has many islands; from all which circumstances arise the lowness of the temperature, and the piercing cold of the north-west winds. The annual decrease of the forests for the purpose of clearing the ground, and the consumption for building and fuel, is supposed to have occasioned a considerable decrease of cold in the winter; and if this should be the result, much will yet be done towards bringing the temperature of the European and American continents to something like a level.

Continents have a colder atmosphere than islands situated in the same degree of latitude; and countries lying to the windward of the superior classes of mountains, or forests, are warmer than those which are to the leeward. Earth always possessing a certain degree of moisture, has a greater capacity to receive and retain heat than sand or stones, the latter therefore are heated and cooled with more rapidity: it is from this circumstance that the intense heats of Africa and Arabia, and the cold of Terra del Fuego, are derived. The temperature of growing vegetables changes very gradually; but there is a considerable evaporation from them: if these exist in great numbers, and congregated, or in forests, their foliage preventing the rays of the sun from reaching the earth, it is perfectly natural that the immediate atmosphere must be greatly affected by the ascent of chilled vapours.

Our next object is the ascent and descent of water. The first-mentioned operation of this fluid has been noticed already. See EVAPORATION.

Dews, the effect of the same cause, are variously accounted for by different observers of nature; the general result, however, seems to be, that they are the last feeble efforts of evaporation, which deprived of their warm stimulus by the approach of night, fall through the chill of the air in extremely small and distinct globules, covering every substance with that trembling and brilliant lustre which rain is incapable of affording through the weight of each drop. According to Hales 3.28 inches of dew annually falls on the earth; but Dalton asserts that the quantity is about 5 inches in the same period. M. Prevost made some curious experiments to ascertain why dew should be deposited on glass, when it did not adhere to metal almost in contact: plates of metal fixed on glass are sometimes covered by dew, and at others the case is reversed; in the latter instance they are bounded by a dry zone: if the other surface of the glass is exposed, the part opposed to the metal remains perfectly dry; and if the metal is applied again, it will not prevent the deposition. The experiment may be made at a window when moisture attaches to either side. M. Prevost observes that glass is covered externally, even when the air is warmest within the house, and that metal fixed internally receives more moisture than the glass. After pursuing the subject to its utmost limits, this gentleman concludes that the phenomena are entirely the effect of the action of heat. That description of dew known by the name of honey-dew is attributed to insects.

The strata of air near the surface of the earth unquestionably contains more moisture, or vapour, than the higher parts of the atmosphere. The regions above the summits of mountains are probably very dry; and De Luc and Saussure say, the air on those they explored was less impregnated with vapour in the night than during the day; for as the stratum next the earth condenses and cools at the former period, there can be no doubt that each stratum descends, yet as clouds are seen to tower far above the most elevated peaks, vapour must at particular times rise to an amazing height.

Rain never descends till the transparency of the air ceases, and the invisible vapours become vesicular, when clouds form, and at length the drops fall: clouds, instead of forming gradually at once throughout all parts of the horizon, generate in a particular spot, and imperceptibly increase, till the whole expanse is obscured. It is singular that clouds collect and spread at a considerable height in the atmosphere, where the air is drier than in the lower strata, which are generally overcharged with moisture. "It is equally remarkable," says a late writer, "that the part of the atmosphere at which they form has not arrived at the point of extreme moisture, nor near that point, even a moment before their formation." Thus it appears that their formation does not proceed from a greater quantity of vapour accumulating than could remain in the atmosphere without passing its maximum. M. De Luc asserts, that the heat of clouds exceeds that of the surrounding air in some particular instances; hence their formation cannot arise from the capacity of air for combining with moisture being decreased by cold, as clouds may frequently be observed, which, after floating through the atmosphere during the heat of the day, disappear at night when the heat diminishes: thus we might proceed to prove that clouds do not originate in the way supposed by many observers, and that we are still ignorant in what manner vapour is disposed of after it enters the atmosphere; and why it rejects its assumed form, returns again to vapour, and falls in rain; and why evaporation should prevail during very hot and dry seasons, without visibly saturating the whole atmosphere. Theories in this instance are of very little use, as the subject is evidently placed too far out of our reach for experiment, in this state of uncertainty we must have recourse to facts.

The quantity of rain, taken at an annual mean, is the greatest at the equator, and it lessens gradu-

ally to the poles; but there are fewer days of rain there, the number of which increase in proportion to the distance from it. The Journal de Physique contains the following observations: "From north latitude 12° to 43°, the mean number of rainy days is 78; from 43° to 46°, the mean number is 103; from 46° to 50°, 134; and from 51° to 60°, 161." Winter often produces a greater number of rainy days than summer, though the quantity of rain is more considerable in the latter than in the former season: at Petersburg rain and snow falls on an average 84 days of the winter, and the quantity amounts to about five inches; on the contrary, the summer produces eleven inches in about the same number of days. Mountainous districts are subject to great falls of rain, among the Andes particularly it rains almost incessantly, while the flat country of Egypt is consumed by endless drought. The rain guage affords reason to suppose, that a greater quantity of rain falls in the lower strata of the atmosphere than in those above, which may be accounted for by the drops attracting vapour in their near approach to the earth, though it must be admitted, that Mr. Copland, of Dumfries, discovered the rain collected in the lower guage was greatest when it continued falling for some time, and that the greatest quantity was collected in the higher during short rains, or at the conclusion of lengthened ones.

As rain is known to fall at all hours of the day and night, and at every season of the year, it is apparent that it is caused by operations which prevail eternally, and without defined interruption. M. Toaldo seems to think that a greater quantity descends in the night than in the day; and it is certain that a south wind produces more rain than any others, though it falls during the prevalence of every wind: heavy falls also occur in the most complete calms. M. Cotte published a paper in the Journal de Physique, from which it appears that the mean quantity of rain descending at 147 places, between latitude 11° and 60° north, is 34.7 inches. "Let us suppose then," observes Dr. Thomson, "(which cannot be very far from the truth) that the mean annual quantity of rain for the whole globe is 34 inches. The superfices of the globe consists of 170,981,012 square miles, or 686,401,498,471,475,200 square inches: the quantity of rain, therefore, falling annually will amount to 23,337,650,812,030,156,800 cubic inches, or somewhat more than 91,751 cubic miles of water."

There are 52,745,253 square miles of dry land on the globe; consequently the annual amount of the quantity of rain descending upon it will be 30,960 cubic miles. The sea is supposed to receive 13,140 cubic miles of water which flows into it annually; therefore it must supply an equal quantity by evaporation, or the land would be completely drained of every particle of moisture. Mr. Dalton estimates the quantity of rain falling in England at 31 inches.

Exclusive of the general appearance of vapour, when condensed into clouds, there are other forms in which the existence of moisture in the atmosphere is observable, particularly the halo, a luminous circle appearing under certain circumstances round the sun, moon, and stars. This has been almost universally ascribed to the rays of light issuing from those bodies passing through a frozen medium of hail or snow; and that this may be the case admits of very little doubt; but it is equally probable, that the rays of the sun breaking through an uniformly dense cloud, nearly exhausted by rain falling from it, may produce a similar effect on moisture in a fluid state, and this is demonstrated frequently by the sun appearing through such clouds. The parhelia, or mock sun, is another phenomenon, effected by the rays of the sun darted upon frozen or fluid particles of water on either side of that body; but the exact manner in which this appearance originates cannot, for obvious reasons, be ascertained.

A constant attendant upon each of the phenomena that we have attempted to illustrate is wind, the doctrine of which deserves every possible attention, as much of our comfort, and health, and commerce wholly depends upon it. Were it not for this agitation of the air putrid effluvia arising from the habitations of man, and from vegetable substances, besides the exhalations from water, would soon render it unfit for respiration, and a general mortality would be the consequence. In this instance also the philosopher finds his progress arrested, and his research bounded by insurmountable obstacles; still, however, there are many facts established that are highly satisfactory. The temperate zones are not under the influence of as regular winds as between the tropics: the *trade wind* prevails annually and regularly in those parts of the Pacific and Atlantic oceans which lie near the equator; it blows from the north-east within a few points on the north side of the equator, and from the south-east on the opposite side, and the interval space of these separate winds is from the second to the fifth degree of north latitude, and within the limits just mentioned, where the wind may be said never to blow from the north or the south; but there are dreadful storms, and perfect calms, equally dangerous and perplexing to the mariner, who finds the force of the trade winds decline as he approaches their boundary. Between the tenth and thirtieth degrees of south latitude the trade wind prevails in the Indian ocean; but north of it there is a change every half year, when they blow in an opposite direction to their previous course: these are termed monsoons, and their change is constantly productive of variable airs and storms of extreme violence, which frequently continue from five to six weeks, during which period the navigation is very dangerous. The monsoons take place one on the south and the other on the north side of the equator in the Indian ocean, and they extend to the eastern coast of China, and the longitude of New Holland, from Africa: they, however, suffer partial changes through local circumstances. They are, besides, not altogether confined to the space just mentioned, as the wind blows from the east or north-east between September and April, and for the remainder of the year from the south-west on the coast of Brazil, between cape St. Augustine and the isle of St. Catherine. Having thus directed the attention of the reader to this part of the subject, we shall pass to the prevailing winds of our native country, which were ascertained by order of the Royal Society of London, which learned body published the following result in their Transactions.—At London.

| Winds. | Days. | Winds. | Days. |
|---|---|---|---|
| South-west . . . . | 112 | South-east . . . . | 82 |
| North-east . . . . . | 58 | East . . . . . . . . | 26 |
| North-west . . . . . . | 50 | South . . . . . . . | 16 |
| West . . . . . . . . . . | 53 | North . . . . . . . | 16 |

The same register shews, that the south-west wind blows more upon an average in each month of the year than any other, particularly in July and August; that the north-east prevails during January, March, April, May, and June, and is most unfrequent in February, July, September, and December; the north-west occuring more frequently from November to March, and less so in September and October than in any other months. In the fifth volume of the Statistical Account of Scotland there is a table of seven years close observation made by Dr. Meek, near Glasgow, the average of which is stated as follows:

| Winds. | Days. | Winds. | Days. |
|---|---|---|---|
| South-west ..... | 174 | North-east .. | 104 |
| North-west ...... | 40 | South-east ... | 47 |

In Ireland the prevailing winds are the west and south-west. The different degrees of its motion next excites our attention; and it seems almost superfluous to observe, that it varies in gradations from the gentlest zephyr, which plays upon the leaves of plants, gently undulating them, to the furious tempest, calculated to inspire horror in the breast of the most callous: it is also a most remarkable fact, that violent currents of air pass along, as it were within a line, without sensibly agitating that beyond them. An instance of this kind occurred at Edinburgh, when the celebrated aeronaut Lunardi ascended in his balloon, which was conveyed with great velocity by the wind at the rate of 70 miles an hour, while a perfect calm existed in the city and neighbourhood.

There are many circumstances attending the operations of the air, which we term wind, that serve for a basis for well-founded conjectures, and those united to the result of daily observation, render the explanation of its phenomena tolerably satisfactory. It must be clear to the most common capacity, that as the rays of the sun descend perpendicularly on the surface of the earth under the torrid zone, that part of it must receive a greater portion of heat than those where they fall obliquely; the heat thus acquired communicates to the air, which it rarifies and causes to ascend, and the vacuum occasioned by this operation is immediately filled by the chill air from the north and south. The diurnal motion of the earth gradually lessens to the poles from the equator: at that point it moves at the rate of fifteen geographical miles in a minute: this motion is communicated to the atmosphere in the same degree; therefore if part of it was conveyed instantaneously from latitude 30° it would not directly acquire the velocity of that at the equator; consequently the ridges of the earth must meet it, and give it the appearance of an east wind; the effect is similar upon the cold air proceeding from the north and south, and this similarity must be admitted to extend to each place particularly heated by the beams of the sun.

The moon being a large body, situated comparatively near the earth, is known to affect the atmosphere in its revolutions by the pressure of that upon the sea, so as to cause the flux and reflux of it; which we term tides: it cannot, therefore be doubted, that some of the winds we experience are caused by her motion.

The regular motion of the atmosphere, known by the name of land and sea-breezes, may be accounted for upon the above principle: the heated rarified land air rises, and its place is supplied by the chill damp air from the surface of the sea; that from the hills in the neighbourhood becoming cold and dense in the course of the night, descend and press upon the comparatively lighter air over the sea, and hence the land breeze. Granting that the attraction of the moon, and the diurnal movement of the sun, affects our atmosphere, there cannot be a doubt but a westward motion of the air must prevail within the boundaries of the trade winds, the consequence of which is an easterly current on each side; from this then it proceeds that south-west winds are so frequent in the western parts of Europe, and over the Atlantic ocean. Mr. Kirwan attributes our constant south-west winds, particularly during winter, to an opposite current prevalent between the coast of Malabar and the Moluccas at the same period: this, he adds, must be supplied from regions close to the pole, "which must be recruited in its turn from the countries to the south of it in the western parts of our hemisphere."

The variable winds cannot be so readily accounted for, yet it is evident that though they seem the effect of capricious causes, they depend upon a regular system arranged by the great Author of nature. That accurate and successful observer of part of his works, the celebrated Franklin, discovered in 1740 that winds originate at the precise point towards which they blow. This philosopher had hoped to observe an eclipse of the moon at Philadelphia, but was prevented by a north-east storm that commenced at seven in the evening. This he afterwards found did not occur at Boston till eleven, and upon enquiry he had reason to suppose it passed to the north-east at the rate of about 100 miles an hour. The manner in which he accounts for this retrograde proceeding is so satisfactory, that we shall give it in his own words, particularly as his assertions are supported by recent observations both in America and Scotland. He argued thus: "I suppose a long canal of water, stopped at the end by a gate. The water is at rest till the gate is opened; then it begins to move out through the gate, and the water next the gate is first in motion, and moves on towards the gate; and so on successively, till the water at the head of the canal is motion, which it is last of all. In this case all the water moves indeed towards the gate, but the successive times of beginning the motion are in the contrary way, viz. from the gate back to the head of the canal. Thus, to produce a north-east storm, I suppose some great rarefaction of the air, in or near the Gulph of Mexico; the air arising thence has its place supplied by the next more northern, cooler, and therefore denser and heavier air; a successive current is formed, to which our coast and inland mountains give a north-east direction." According to the observations made by captain Cook, the north-east winds prevail in the Northern Pacific ocean during the same spring months they do with us, from which facts it appears that the cold air from America and the north of Europe flows at that season into the Pacific and Atlantic oceans. (*British Encyclo.*) For more on this subject, see Rain, Weather, Wind, &c.

METEOROMANCY, a species of divination by meteors, principally by lightning and thunder: this method of divination passed from the Tuscans to the Romans, with whom, as Seneca informs us, it was held in high esteem.

METE'OROUS. *a.* (from *meteor.*) Having the nature of a meteor (*Milton*).

METER. *s.* (from *mete.*) A measurer.

METEWAND. METEYARD. *s.* (*mete* and *yard*, or *wand.*) A staff of a certain length wherewith measures are taken (*Ascham. Leviticus*).

METHEGLIN. *s.* (*meddyglyn*, Welsh.) Drink made of honey boiled with water and fermented. See MEAD.

METHINKS, *verb impersonal.* I think; it seems to me; meseems (*Spenser*).

METHOD. METHODUS. (from μεθοδος.) In logic and rhetoric, the art or rule of disposing things in such a manner, as that they may be easily comprehended; either in order to discover the truth, which we ourselves are ignorant of; or to shew and demonstrate it to others when known, or to fix it in the memory. See DISPOSITION. Gassendus distributes method, with regard to its object, into three kinds, or branches; viz. *methodus inventionis*, the method of invention, or discovering a truth unknown.

*Methodus judicii*, the method of judging or determining of a truth, or proposition, proposed.

And *methodus demonstrationis*, or method of demonstration; that is, of exhibiting it to another.

Method is distributed by others into two general kinds, viz. natural and arbitrary. Natural method is that which observes the order of nature, and proceeds in such a manner, as that the knowledge of things which follow depends in a great measure on the things which go before. Arbitrary method leaves the order of nature, and accommodates itself to many purposes: as to treasure up things, and retain them in the memory; to harangue and persuade mankind to any practice in the religious or civil life; or to delight, amuse, or entertain the mind. This kind of method is chiefly pursued in poetry and oratory.

METHODICAL. *a.* (*methodique*, Fr.) Ranged or proceeding in due or just order (*Addison*).

METHODICALLY. *ad.* According to method and order (*Suckling*).

*To* METHODISE. *v. a.* (from *method.*) To regulate; to dispose in order (*Addison*).

METHODISTS, in ecclesiastical history, is a denomination applied to different sects, both papists and protestants. The popish methodists were those polemical doctors, of whom the most eminent arose in France towards the middle of the seventeenth century, in opposition to the Huguenots or protestants. The methodists, from their manner of treating the controversy with their opponents, may be divided into two classes. The one may comprehend those doctors, whose method of disputing with the protestants was disingenuous and unreasonable, and who followed the examples of those military chiefs, who shut up their troops in intrenchments and strong holds, in order to cover them from the attacks of the enemy. Of this number were the jesuit Veron, who required the protestants to prove the tenets of their church by plain passages of scripture, without being allowed the liberty of illustrating those passages, reasoning upon them, or drawing any conclusions from them; Nihusius, an apostate from the protestant religion; the two Walenburgs, and others who confined themselves to the business of answering objections and repelling attacks; and cardinal Richelieu, who confined the whole controversy to the single article of the divine institution and authority of the church. The methodists of the second class were of opinion, that the most expedient manner of reducing the protestants to silence, was not to attack them by piecemeal, but to overwhelm them at once, by the weight of some general principle or presumption, some universal argument, which comprehended, or might be applied to all the points contested between the two churches: thus imitating the conduct of those military leaders, who, instead of spending their time and strength in sieges and skirmishes, endeavoured to put an end to the war by a general and decisive action. These polemics rested the defence of popery upon prescription; the wicked lives of protestant princes who had left the church of Rome; the crime of religious schism; the variety of opinions among protestants, with regard to doctrine and discipline; and the uniformity of the tenets and worship of the church of Rome. To this class belong Nicolle, the Jansenist doctor, the famous Bossuet, &c. Mosh. Eccl. Hist. vol. iv. p. 307, &c. 8vo.

The protestant methodists in this country form a large part of the community. In the year 1729, they sprang up at Oxford, under Mr. Morgan (who soon after died) and Mr. John Wesley. In the month of November of that year, the latter being then fellow of Lincoln college, began to spend some evenings in reading the Greek New Testament along with Charles Wesley, student, Mr. Morgan, commoner, of Christ Church, and Mr. Kirkham, of Merton college. Next year, two or three of the pupils of Mr. John Wesley, and one pupil of Mr. Charles Wesley, obtained leave to attend these meetings. Two years after they were joined by Mr. Ingham, of Queen's college, Mr. Broughton, of Exeter, and Mr. James Hervey; and in 1735, they were joined by the celebrated Mr. Whitfield, then in his eighteenth year. They soon obtained the name of methodists, from the exact regularity of their lives; which gave occasion to a young gentleman, of Christ Church, to say—"Here is a new set of methodists sprung up!" Alluding to a sect of ancient physicians, who practised medicine by method or regular rules, in opposition to quackery or empiricism. Thus was the term methodist originally applied to this body of Christians, on account of the methodical strictness of their lives; but is indeed now, by the irreligious, indiscriminately appropriated to every individual who manifests a more than ordinary concern for the salvation of mankind. These heads differing soon afterwards in religious sentiments, their respective followers distributed themselves into two parts; the one under Mr. George Whitfield, the other

under Mr. John and Charles Wesley. Educated at Oxford, these leaders still continued to profess an attachment to the articles and liturgy of the established church, though they more commonly adopted the mode of worship which prevails among the dissenters. Upon their being excluded from the pulpits in many churches they took to preaching in the fields; and from the novelty of the thing, in conjunction with the fervour of their exertions, they were attended by some thousands of peopl e !In their public labours, Mr. Whitfield having a most sonorous voice, was remarkable for an engaging and powerful eloquence; whilst Mr. John Wesley, being less under the influence of his passions, possessed both in writing and preaching a perspicuous and commanding simplicity. Even their enemies confess that they contributed in several places to reform the lower classes of the community. The colliers at Kingswood, near Bristol, and the tinners in Cornwall, were greatly benefited by their exertions. In consequence of their attention to the religion of Jesus, by the instrumentality of these preachers, many of them rose to a degree of respectability and became valuable members of society. The followers of Mr. Wesley (who died in London, 1791, aged eighty-eight, and was buried in the ground belonging to his chapel, the foundery in Moorfields) are Arminians, though some of his preachers incline to Baxterianism. The followers of Mr. Whitfield (who died in 1770, aged fifty-six, at Newbury Port, near Boston, in New England, and was buried there) are Calvinists, and were warmly patronized by the late countess dowager of Huntingdon, to whom Mr. W. was chaplain, and who was a lady of great benevolence and piety. Lady Erskine (a near relation of the celebrated counsellor of that name) took her situation, and was said to be equally attentive to the concerns of this part of the religious community. With respect to the splitting of the Methodists into Calvinists and Arminians, it happened so far back as the year 1741; the former being for particular, and the latter for universal, redemption.

Both Mr. Wesley and Mr. Whitfield were indefatigable in promoting their own views of the Christion religion, notwithstanding all the reproaches with which they were stigmatized. It is well known that for this purpose they went over several times to America. Mr. Whitfield, indeed, established an orphan house in Georgia, for which he made large collections in this country, and which was since converted into a college for the education of young men, designed chiefly for the ministry. This college has been lately burnt down.

In America the methodists were extremely useful, riding 20 or 30 miles in the course of the day, and preaching twice or thrice to considerable congregations. The account of their labours by Mr. Hampson, in his memoirs of Mr. Wesley, is interesting and impressive. "Their excursions (says he) through immense forests, abounding in trees of all sorts and sizes, were often highly romantic. Innumerable rivers and falls of water; vistas opening to the view, in contrast with the uncultivated wild; deer now shooting across the road, and now scouring through the woods, while the eye was frequently relieved by the appearance of orchards and plantations, and the houses of gentlemen and farmers peeping through the trees, formed a scenery so various and picturesque, as to produce a variety of reflections, and present, we will not say to a philosophic eye, but to the mind of every reasonable creature, the most sublime and agreeable images. Their worship partook of the general simplicity. It was frequently conducted in the open air. The woods resounded to the voice of the preacher, or to the singing of his numerous congregation, whilst the horses fastened to the trees formed a singular addition to the solemnity. It was, indeed, a striking picture, and might naturally impress the mind with a retrospect of the antediluvian days, when the hills and vallies re-echoed the patriarchal devotions, and a Seth or an Enoch, in the shadow of a projecting rock, or beneath the foliage of some venerable oak, delivered his primeval lectures, and was a preacher of righteousness to the people!"

The distinguishing principles of methodism are, salvation by faith in Jesus Christ; perceptible, and in some cases instantaneous conversion; and an assurance of reconciliation to God, with which, they say, the new birth, or being born again, is inseparably attended. On these doctrines they lay the utmost stress. Several persons have written the life of Mr. Wesley; there is one by Mr. Hampson, another by Dr Whitehead, and a third by Dr. Coke and Mr. Moor. Mr. Whitfield's life was drawn up by the late Dr. Gillies, of Glasgow. Mr. Wesley and Mr. Whitfield both published an account of their travels and itinerant labours in this kingdom and in America. These sketches are entitled Journals, and serve greatly to illustrate the principles and progress of methodism.

The Wesleyan methodists are now so exceedingly more numerous than the followers of Whitfield, that the term methodists is now almost constantly confined to the former. They are incorporated into a regular and compact body, and have adopted a system of church-government which has a wonderful tendency to unite the members to each other. Their meetings for worship and for business are of various kinds, and are distinguished into prayer-meetings, class-meetings, band-meetings, watch-nights, love feasts, yearly-covenants, quarterly-meetings, district-meetings, and annual conferences. Their church officers are denominated travelling preachers, who are divided into superintendants and helpers; local preachers, who follow some secular employment, and never travel; class leaders, prayer leaders, or exhorters; band leaders, trustees, and stewards. For the more easy management and union of the whole connection the kingdom is divided into districts, comprehending generally three, four, or more circuits, the whole being under the immediate superintendance of the confer-

ence, which is assembled annually, and consists of one hundred travelling preachers, at first nominated in the will of the late reverend John Wesley, their numbers being regularly filled up by ballot.

The following is an accurate statement of the number of preachers and people in the Wesleyan connection of methodists, at the close of the sixty-third annual conference, held in August 1806:

| | | |
|---|---|---|
| In Great Britain | | 110,803 |
| In Ireland | | 23,773 |
| Gibraltar | | 40 |
| Nova Scotia, New Brunswick, and Newfoundland | | 1,418 |
| West India—whites | 1,775 | 14,940 |
| Coloured people, &c. | 13,165 | |
| United States—whites | 95,628 | 119,944 |
| Coloured people, &c. | 24,316 | |
| Total | | 270,918 |

At the close of the 67th annual conference, held at London in July 1810, the subjoined numbers were published:

| | |
|---|---|
| In Great Britain | 138,000 |
| Gibraltar | 50 |
| Ireland, about | 29,000 |
| West India islands—whites | 1,460 |
| Ditto, men of colour | 10,850 |
| Nova Scotia and Newfoundland | 2,500 |
| United States | 132,000 |
| Total | 313,860 |

In addition to these may be added about 110,000 adult hearers—methodists in religious sentiment; though, from various causes, prevented from formally joining the societies. To these still further may be added about 218,000 more, composed of the younger branches of families, and those generally influenced by the methodist doctrines. About 6000 more may be added, from methodists, who, from some slight difference as to discipline, &c. have formed themselves into independent societies in various parts of the united kingdoms: not now to reckon the methodists of the new connection. The local and travelling preachers, belonging to the different methodist societies, amount to about 1800. Some of these, as Dr. Adam Clarke, Dr. Coke, Mr. Benson, and Mr. Bunting, are men of considerable talents and extensive learning. But many of them, it must be confessed, are extremely illiterate, and have therefore nothing to recommend them but their piety and zeal, of which qualities most of them possess a very extraordinary portion.

Those who wish to know more of this numerous class of Christians may read Benson's Apology for the People of Methodists; and a very striking disquisition on the Evangelical Sects in No. 8 of the Quarterly Review, in which the good and the evil that may result from the farther extension of Westleyan Methodism are appreciated in a masterly, and, in the main, candid manner. As to the work published by Nightingale, under the title of a Portraiture of Methodism, it is but just to say that its author was once a local preacher in that connection, but is now a disciple of Unitarianism. He therefore, under the assumed garb of candour and friendship to the methodists, lampoons them and extols the Socinians; instead of being the historian of the methodists, he is their calumniator; and seems to have written his book only with two objects, to get money, and by the artful intertwining of truth and misrepresentation to render the methodists, their "Adonis's," their "sad rakes among the ladies," &c. &c. contemptible in the eyes of the world.

The methodists have recently found an eloquent advocate in William Wilberforce, Esq. M. P. who pleads their cause at some length, in his treatise on Vital Christianity.

The new methodist connection, among the followers of Mr. Wesley, separated from the original methodists in 1797. The grounds of this separation they declare to be church government, and not doctrines, as affirmed by some of their opponents. They object to the old methodists for having formed a hierarchy or priestly corporation; and say, that in so doing they have robbed the people of those privileges, that, as members of a Christian church, they are entitled to by reason and scripture. The new methodists have therefore attempted to establish every part of their church government on popular principles, and profess to have united as much as possible the ministers and the people in every department of it. This is quite contrary to the original government of the methodists, which in the most important cases, is confined only to the ministers. This, indeed, appears most plainly, when their conference or yearly meeting is considered; for in this meeting, no person, who is not a travelling preacher, has ever been suffered to enter as a member of it. And, indeed, this is the point to which the preachers have always stedfastly adhered with the utmost firmness and resolution, and on which the division at present entirely rests. They are also upbraided by the new methodists for having abused the power they have assumed: a great many of these abuses the new methodists have formally protested against, which are enumerated in various publications, and particularly in the preface to the life of one of their deceased friends, Mr. Alexander Kilham.

The new methodists profess to proceed upon liberal, open, and ingenuous principles, in the construction of their plan of church government; and their ultimate decision in all disputed matters, is, in their popular annual assembly, chosen by certain rules from among the preachers and societies. These professions are at least generous and liberal; but as this sect has yet continued for only a short season, little can be said of it at present. It becomes matter of curious conjecture and speculation, how far the leading persons among them will act agreeably to their present liberal professions. The number of persons who have joined this secession from the methodists

amount to about 7000. During the life of Mr. Kilham they published an interesting magazine, called the Methodist Monitor. We believe this work has been since discontinued.

METHODIUS, a father of the church, bishop of Olympus or Patara in Lycia, and afterward of Tyre in Palestine, suffered martyrdom at Chalcis in Greece towards the end of Dioclesian's persecution in the year 302. He composed many works in a clear and elaborate style, which were extant in Jerome's time. Father Combesis collected several considerable fragments of this writer, cited by Epiphanius, Photius, and others; and printed them with notes of his own, together with the works of Amphilochius, and Andreas Cretensis, in folio, Paris, 1644.

ME'THOUGHT. The *pret.* of *methinks*.

METHVEN, a town of Scotland, in Perthshire, with an ancient castle. It has manufactures of broad and narrow linen; with two paper and some other mills. King Robert Bruce, soon after his coronation in 1306, was defeated here by the English troops under the earl of Pembroke, and found himself forsaken by the greater part of his army. It is six miles W.N.W. of Perth.

METHUSELAH, the son of Enoch and father of Lamech, was born in the year of the world 687, begat Lamech in 874, and died in 1656, being the very year of the deluge, at the age of 969, which is the greatest age that has been attained to by any mortal man upon earth. (Gen. v. 21, 22, &c.) According to the text of the Septuagint, Methuselah must have lived 14 years after the deluge; and according to other copies he died six years before it: but it is generally agreed on, that these copies, as well as the Septuagint, are corrupted in this place.

METHWOLD, a town in Norfolk, with a market on Tuesday, 15 miles N.W. of Thetford, and 86 N.N.E. of London. Lon. 0. 40 E. Lat. 52. 34 N.

METHYMNA, (anc. geog.) a town of the island of Lesbos. It was the second city of the island in greatness, population, and opulence. Its territory was fruitful, and the wines it produced excellent. It was the native place of Theophrastus, and of Arion the musician. When the whole island of Lesbos revolted from the power of the Athenians, Methymna alone remained firm to its ancient allies.

METIUS (James), of Alcmaer, in Holland, the inventor of telescopes with glasses, one of which he presented to the States-General in 1609. Tubes, extended, by uniting them, to a great length, were known to the ancients; but Metius was the first who added glasses, and he was indebted to chance for the discovery: he had frequently observed some school-boys playing upon the ice, who made use of their copy-books rolled up in the shape of tubes, to look at each other, to which they sometimes added pieces of ice at each end, to view distant objects: this led him to the invention of telescopic lenses.

METON, an Athenian mathematician, who invented what is called in chronology the golden number. He flourished B.C. 432.

METONY'MICAL. *a.* (from *metonymy.*) Put by metonymy for something else.

METONY'MICALLY. *ad.* By metonymy; not literally (*Boyle*).

METO'NYMY. *s.* (μετωνυμία.) A rhetorical figure, by which one word is put for another, as the matter for the materiate: *he died by steel*, that is, by a sword.

METOPO'SCOPY. *s.* (μέτωπον and σκέπτω.) The study of physiognomy.

METRE, or METER, Μετρον, in poetry, denotes a system of feet of a just length. Aristides defines metre, a system of feet composed of dissimilar syllables, of a just extent. In which sense metre amounts to much the same with genus carminis, or the sort of verse, and differs from rhythm.

METRE, in the new French measure, is the ten-millionth part of the distance between the equator and the north pole. See MEASURES.

METRIC. An epithet applied by the ancient Greeks to that part of their music which had for its object the letters, syllables, feet, and verses, of the poem. The metric differed from the rhythmic in that the former was only used in the form of the verses, while the second was confined to the feet of which they are composed.

ME'TRICAL. *a.* (*metricus*, Latin.) 1. Pertaining to metre or numbers. 2. Consisting of verses.

METRITIS. (*metritis*, μητριτις; from μητρα, the womb.) Inflammation of the uterus. See HYSTERITIS.

METRODORUS, a disciple of Democritus, and master of Anaxarchus and Hippocrates. He was a physician of Chios, and held the eternity of the universe.

METRODORUS, a famous painter and philosopher of Stratonice, B. C. 171. He was sent to Paulus Æmilius, who, after the defeat of Perseus, demanded of the Athenians a painter and philosopher; the former to paint his temples, and the latter to instruct his children. Metrodorus fully satisfied him in both capacities.

METROPOLIS (from μήτηρ, *mother*, and πολις, *city*), the capital of a country or province, or the principal city; and, as it were, mother of all the rest. The term metropolis is also applied to archiepiscopal churches, and sometimes to the principal or mother-church of a city. The Roman empire having been divided into 13 dioceses and 120 provinces, each diocese and each province had its metropolis or capital city, where the proconsul had his residence. To this civil division the ecclesiastical was afterwards adapted, and the bishop of the capital city had the direction of affairs, and the pre-eminence over all the bishops of the province. His residence in the metropolis gave him the title of metropolitan. This erection of metropolitans is referred to the end of the third century, and was confirmed by the council of Nice. A metropoli-

tan has the privilege of ordaining his suffragans; and appeals from sentences passed by the suffragans are preferred to the metropolitan.

METROPO'LITAN. *s.* (*metropolitanus*, Latin.) A bishop of the mother church; an archbishop (*Clarendon*).

METROPO'LITAN. *a.* Belonging to a metropolis (*Raleigh*).

METROPOLI'TICAL. *a.* (from *metropolis.*) Chief or principal of cities (*Knolles*).

METROPTOSIS. (*metroptosis*, μετροπτωσις, from μητρα, the uterus, and πιπτω, to fall down). Prolapsis uteri. The descent of the uterus through the vagina.

METROSIDEROS, in botany, a genus of the class icosandria, order monogynia. Calyx five-cleft, half superior; petals five; stemens very long, exserted; stigma simple; capsule three or four-celled. Fourteen species. Trees and herbs of Australasia and Polynesia; some with opposite, others with alternate, leaves.

ME'TTLE. *s.* (corrupted from *metal.*) 1. Spirit; spriteliness; courage (*Pope*). 2. Substance (*Shakspeare*).

METTLE, a cant term among horse-dealers to express spirit or heart. There is great difference between a mettled horse, a horse of vigour, and a fiery horse; but as this is not sufficiently attended to in the purchase of this animal, some general rules for the distinguishing real vigour in a horse may be acceptable.

When a horse is standing still, the rider who has a mind to try whether he has vigour in him should keep him fast with the bridle-hand, and apply the spurs to the hair of his sides; this is called by horsemen pinching. If the horse be impatient under this, gathering himself up, and endeavouring to go forwards, and champs upon the bit, without thrusting out his nose, it is a sign of vigour and right mettle in him. Some caution is to be used, however, in judging by this, to distinguish between a horse that has vigour really in him, and one that has only a fine skin, and is rather ticklish than mettled. This is the case with a great many horses, and is found by their being very sensible of the touch of the spur, and shewing the appearance of a great deal of mettle and vigour, when touched, but immediately losing the apprehension of it. These are, in fact, of a dull disposition, and only have a tender skin.

The mettled horse is to be highly valued; but the fiery one is good for nothing. A horse that is truly vigorous should be calm and cool; he should in general move on patiently, and only shew his mettle when it is required of him.

The surest method is to choose such horses as are extremely apprehensive of strokes, and are afraid at the least appearance of their coming. These, at only the closing of the legs and thighs, seem to be seized with fear and alarmed, but that without fretting or fierceness. A horse that walks deliberately and securely, and that, without requiring the whip too often, will go on briskly and without fretting; will go on from the walk to the gallop, and as easily from the gallop to the walk again, and continually champs upon the bit, and trots with freedom, upon the shoulders easily, and snorting a little through his nostrils: this is generally a creature of true mettle and vigour, though it does not rise to such a fierceness as is troublesome or dangerous. If to these good qualities a horse be well upon his haunches, and have a light and easy stop, his head well placed and firm, and the feeling of his bit equal and just, the buyer will seldom need to complain of the price.

ME'TTLED. *a.* (from *mettle.*) Sprightly; courageous; full of ardour (*B. Jonson*).

ME'TTLESOME. *a.* (from *mettle.*) Sprightly; lively; gay; brisk; airy (*Tatler*).

ME'TTLESOMELY. *ad.* With sprightliness.

METZ, an ancient and strong town of France, in the department of Moselle, with a bishop's see, whose bishop had the title of a prince of the empire. The cathedral is one of the finest in Europe. The Jews, about 3000, live in a part of the town by themselves, where they have a synagogue. The sweetmeats made here are in high esteem. Metz was formerly the capital of the kingdom of Australia; its fortifications are excellent, and it has one of the strongest citadels in Europe. The inhabitants are computed at 40,000, beside a numerous garrison, who have noble barracks. It is seated at the confluence of the Moselle and Seille, 25 miles N.W. of Nanci, and 190 N.E. of Paris. Lon. 6. 16 E. Lat. 49. 7 N.

METZU (Gabriel), an eminent painter, was born at Leyden in 1615. His subjects were usually taken from low life; but they were all designed after nature, and surprisingly well represented; such as women selling fish, fowls, or hares; sick persons attended by the doctor; chemists in their laboratories; dead game; painters' rooms, shops, and drawing-schools hung with prints and pictures; all which subjects he composed well, and finished them with extreme neatness; as he likewise did his portraits. He spent a great deal of time on his pictures, which has occasioned their scarcity and dearness at this time; and besides, it is confidently said, that the Dutch prevent their being carried out of their own country as much as possible. So that those paintings of Metzu, which are sometimes seen in the collections of our kingdoms, are either obtained by chance, or purchased at large prices. Though it ought also to be remembered, that the value set upon the works of this master throughout Holland and Flanders has induced several painters to endeavour at imitating and copying his works, which having gradually circulated abroad, and being a little mellowed by time, are now called originals. He died in 1658.

MEU. See MEUM ATHAMANTICUM.

MEUDON, a village of France, where was a magnificent royal palace on the Seine, six miles S.E. of Paris.

MEULAN, an ancient town of France, in the department of Seine and Oise. It is built

in the form of an amphitheatre, on the river Seine, over which are two bridges, 20 miles N.W. of Paris. Lon. 1. 57 E. Lat. 49. 1 N.

MEUM ATHAMANTICUM. (*meum*, μηον, or μειον; from μειων, less, so called, according to Minshew, from its diminutive size.) *Meu.* Spignel. Baldmoney. The root of this plant, *æthusa mœum*, is recommended as a carminative, stomachic, and for attenuating viscid humours, and appears to be nearly of the same nature as lovage, differing in its smell, being rather more agreeable, somewhat like that of parsnips, but stronger, and being in its taste less sweet, and more warm or acrid.

MEURS, a town of Germany, in the duchy of Cleves, seated on the Rhine, 15 miles N.W. of Dusseldorf. Lon. 6. 41 E. Lat. 51. 25 N.

MEURSIUS (John), a learned Dutchman, born in 1579. He received his academical education at Leyden, where he wrote, when only sixteen, a Commentary on Lycophron. In 1610 he was appointed professor of history, and afterwards of Greek. He was also chosen historiographer of the United States. Meursius suffered much persecution in consequence of his connection with Barneveldt; on which he left his country, and went to Denmark, where he died in 1639. He excelled in his knowledge of the Greek language, and antiquities. His works are very numerous and valuable; the best is his Elusinea sive de Cereris, Eleusiniæ sacro et sesto.

MEURTHE, a department of France, including part of the late province of Lorrain. It is so called from a river that rises in the department of the Vosges, and watering Luneville and Nanci falls into the Moselle. Nanci is the principal see of this department.

MEUSE, a department in France, including the late duchy of Bar. It takes its name from the river Meuse, or Maese. Bar-le-Duc is the capital. See MAESE.

MEUSE. (*mews*, from *mew.*) A narrow opening at the bottom of quickset and other hedges, as well as in the bushy underwood of coverts, through which hares take their track, when going to, or coming from, feed during the night. At these meuses the expert and experienced poacher fixes his wires (commonly called snares) with so much security and success, as generally to repay himself well for his labour.

MEUSNIER (Philip), a French painter of architecture, was the pupil of James Rousseau. He was a member of the French academy, and patronized by Louis XIV. and XV. He died at Paris in 1734, aged 79.

*To* MEW. *v. a.* (from the noun.) 1. To shut up; to confine; to imprison; to enclose (*Spenser*). 2. To shed the feathers (*Walton*). 3. (*miauler*, Fr.) To cry as a cat (*Grew*).

MEW, in ornithology. See LARUS.

MEWARI, a considerable town of Japan, in the island of Niphon, with a royal palace. It is seated on a hill, at the foot of which are vast fields of wheat and rice, with fine orchards, full of excellent plums.

MEWAT, a hilly and woody tract of Hindustan Proper, lying on the S.W. of Delhi, confining the low country, along the W. bank of the Jumna, to a comparatively narrow slip, and extending westward 130 miles. From N. to S. it is 90 miles. Although situate in the heart of Hindustan, within 25 miles of its former capital (Delhi), its inhabitants, the Mewatti, have been ever characterized as the most savage and brutal; and their chief employment has been robbery and plunder. In 1265, 100,000 of these wretches were put to the sword; but they are still so noted as thieves and robbers, that parties of them are taken into pay by the chiefs of Upper Hindustan, in order to distress the countries that are the seat of warfare. Mewat contains some strong fortresses on steep and inaccessible hills, and was almost entirely subject to the late Madagee Sindia, a Mahratta chief.

MEWAT-ALI, a town of Persia, in Irac-Arabia, not so considerable as formerly, but famous for the superb and rich mosque of Ali, to which the Persians go in pilgrimage from all parts. It is 100 miles S.W. of Bagdad. Lon. 42. 57 E. Lat. 32. 0 N.

MEWING. (this should be written muing, from the French *muer.*) Is an old forest term for a stag's shedding his horns.

MEWS. (from *mew.*) Is a receptacle for horses and carriages, appropriated to no other use whatever. The buildings consist of stables and coach-houses only, with conveniences above for the residence of coachmen and their families. In all the newly-erected squares and places at the western extremity of the metropolis, most of the houses are so constructed, that the master and servants have access to the stables by a communication at the back of the dwelling-house, without the inconvenience of passing through the streets.

*To* MEWL. *v. n.* (*miauler*, French.) To squall as a child (*Shakspeare*).

MEXICO, or NEW SPAIN, a country of N. America, bounded on the north-west by New Mexico, on the east by the Gulf of Mexico, on the south-east by the isthmus of Darien, and on the south and west by the Pacific ocean; about 550 leagues in length; the breadth is very unequal, in some parts 160 leagues, but towards the isthmus of Darien hardly twenty. The greater part being situated under the torrid zone, the heat is great, but generally moderated by partial or general rains, or by sea breezes, which blow alternately. In some districts the exhalation of lakes and rivers cool the air, and render it mild and agreeable. From February to April the air is burning during the day, no cloud intercepts the rays of the sun, lakes and rivers are dried up, and water can hardly be found. In April the rains commence, and continue till September, attended with dreadful thunder and lightning, inundating the low lands. Upon the east coast the soil is low, marshy, always inundated in the rainy seasons, and bounded by impenetrable forests; the prospect is gloomy, and the air unhealthy. In the interior parts the air is milder and more pure,

the soil fertile, and the country agreeably diversified; on the western coast the soil is good, the borders more elevated, and a greater variety is observed in the productions. The Spaniards have abandoned the east coasts; and the malignant air, forests almost impervious to man, morasses and inhospitable deserts, are a better security than fortresses and garrisons of soldiers. The mines of gold and silver are abundant, of the latter they count above a thousand; gold is found in the brooks and rivers, as well as in the mines: these mines are only found in barren rocks or mountains; some of the veins are followed to an astonishing depth, even to a thousand feet below the general surface of the earth. The person who discovers a mine has a right to work it, on paying to the king a tenth of its produce. This property includes a circle, whose diameter is 800 feet, beyond that another adventurer has a right to search. These are not the only riches produced; here are also mines of iron, copper, lead, alum, crystal, vitriol, different kinds of precious stones, emeralds, turquoises, jasper, porphyry, marble, fossil salt, &c. Mineral springs are abundant, and in several parts volcanos. No country produces a greater abundance of grain, fruits, or legumes; among the forest trees are the cedar, brazilwood, mahogany, and many others unknown in Europe. Among the animals may be reckoned lions, tygers, wild-cats, bears, wolves, foxes, deer, goats, squirrels, rats, armadillos, hogs, &c. Mexico produces maize, wheat, barley, rice, peas, beans, and other grain; with a great variety of drugs since added to the European list, such as copal, anime, tacamahac, caranna, liquid amber, balsam of Tolu, guaiacum, mechoacan root, sarsaparilla, and many more. Other productions are cotton, which employs the manufacturers of the country, cochenil, cacao, honey, dying woods, tobacco, ginger, pearls, sugar, indigo, &c. Innumerable herds of cattle run wild in the savannas and woods, whose skins and fat form an important article of commerce. Sheep are numerous, but the wool is of little value; the lions are grey, and not so formidable as those of Africa; the tygers are smaller; bears are uncommon. Among the birds may be reckoned those of the domestic kind, goldfinches, nightingales, and upwards of twenty species of singing birds, pigeons, parrots, parroquets, eagles, vultures, pelicans, ravens, macaws, &c. &c. Serpents are numerous, as likewise scorpions, spiders, ants, and musquetos; and sometimes locusts, in the space of a night, will destroy the harvest of a district. In the rivers, in the lakes, and on the coasts, are found variety of fish, and a great number of alligators. The empire of Mexico was at first called *Anahac*, and does not appear to have been very ancient; it was occupied by different tribes, of which the most civilized formed themselves into societies. The Mexicans are said to come from the borders of the Gulf of California, and fixed themselves near a large lake, in the midst of which they founded the city of Mexico, which increased insensibly. For a long time they had no kings, only electing chiefs in time of war, but one of these contrived means to make his power continual and hereditary. Montezuma was the ninth in succession; these princes were despotic, fear was the support of their government. The empire was not formed of the provinces which enjoyed the same laws; some of the provinces were only tributary, enjoying their own laws, others were governed by grandees named by the monarch. Agriculture was imperfect, and consisted principally in the cultivation of rice and cacao, which were the chief food of the people; the rich only indulged themselves in fowl, fish, and game, among which were reckoned small dogs; drunkenness was by all ranks held as an odious vice. They went almost naked; they painted their bodies, and ornamented their heads with feathers, their noses and their ears with bone and small works of gold. The king was only distinguished from the rest of the people by a cloak of knit cotton thrown over his right shoulder; his palace had no windows: the ordinary houses were huts, some of stone, the roofs covered with branches of trees; vessels of earth, mats, some seats of palm leaves, were the principal furniture; the arts of luxury were rude; their paintings were without grace, and without design; their application to history did honour to their genius; their wars and their funerals were bloody; their towns were extensive, but their houses scattered; their most beautiful temple was only partly built of stone, in which they placed a statue of their divinity, and upon his altars they sacrificed their victims. Their religion was atrocious and terrible; their divinities inspired terror, and seemed only to breathe vengeance; they were surrounded with serpents, tygers, and the most obnoxious animals. To these divinities, it is said, they sacrificed yearly 2000 human victims. Such, in general, was the state of Mexico when conquered by Cortez in the year 1519. The country was lately governed by a viceroy, who represented the king of Spain, and was as absolute in himself, in all things political, military, civil, and criminal; his allowable revenues were 40,000 ducats a year, his secret ones amounted to a much greater sum; his employment continues five years. Under him were three tribunals, called audiences, for the administration of justice; these audiences take their names from different cities, Mexico, Guadalajara, and Guatimala. The inhabitants of Mexico consist of native Spaniards, Creoles, who are the descendants of Spaniards, Mulattoes, the issue of an European and an African slave; Metiffs, born of an European and an Indian; Mestizes, the descendants of Metiffs; Terceroens, their descendants, Quarteroens, after which the fifth generation enjoys all the privileges of Creoles. They reckon in Mexico 500,000 Spaniards, one million of Negroes, Mulattoes, and Mestizes, and two million of Indians. The audience of Mexico contains the provinces of Mexico Proper, Mechoacan, Guasteca, Tlascala, Guaxaca, Tabasco, and Yucatan. This is the most important of the Spanish possessions to the north of the line;

and surpasses the other audiences in riches and extent.

Mexico proper, a province of North America, which is said to owe its name to an ancient idol, named Mixitli, from whence is formed the word Mexico. It is reported to exceed all the provinces in America in extensive beautiful vallies, rich arable lands, and delicious pasturage. Fruits are here in the greatest variety, perfection, and abundance; the great lakes, rivers, and the neighbourhood of the sea, afford fish of every kind. In a word, it enjoys every external and internal advantage, being washed towards the south by the Pacific ocean, by which means the inhabitants trade with the other maritime provinces, while the richness of the country furnishes every article of commerce, and the roads, lakes, and rivers, every requisite of domestic industry and intercourse. The climate is indeed variable: strangers complain of its excessive heat, while the natives frequently shiver with cold; however, both, who are blessed with sound constitutions, agree, that it is temperate and pleasant in general. The soil is so fruitful, that notwithstanding the great abundance of money, and the external luxury of the Mexicans, the necessaries of life are exceedingly reasonable, a pregnant proof of the plenty that reigns in the provinces. The silver mines are much richer than those of Mechoachan, or indeed of any other province of the empire, and their value is still augmented by the ore's containing a considerable portion of gold.

Mexico, a city of America, and capital of the government so called, situated on a vast lake, surrounded by high mountains. The situation is now, where it always was; the Spaniards not thinking it necessary to desert a city so well built and magnificent. In point of regularity it exceeds all the cities in the universe. The want of gates, walls, and artillery, together with the five great causeways leading to the city, render Mexico extremely remarkable. All the buildings are convenient, but the public edifices are magnificent. It is the see of an archbishop, and contains twenty-nine churches, and twenty-two monasteries and nunneries, of the opulence of which we may form some judgment from the revenue of the cathedral, that amounts to nearly 80,000l. a year, out of which the archbishop has 15,000l. annually, besides vast sums that arise by way of perquisites. All the inhabitants are, indeed, immensely wealthy; and nothing can convey a higher idea of the vast grandeur and riches of Mexico than the prodigious quantities which are daily exposed to sale in the streets of the most valuable commodities of Europe and Asia. The great square in the middle of the town is extremely magnificent, and the palace of the marquis de Valle, as it is called, one of the noblest pieces of architecture any where to be met with. It is built in the very spot where formerly stood the palace of Motezuma, and occupies nearly the same space. Several of the hospitals are superb; but what most strikes the eyes of a traveller, is the vast abundance of silver, gold, and jewels, exposed in plate and toys in the streets, by the goldsmiths and shopkeepers; and though it has no seaport, nor any communication with the sea by navigable rivers, it enjoys a prodigious commerce, and is itself the centre of all that is carried on between America and Europe on one hand, and between America and the East Indies on the other. The goods from Acapulco to La Vera Cruz, or from La Vera Cruz to Acapulco, for the use of the Philippines, and in a great measure for the use of Peru and Lima, pass through this city, and employ an incredible number of horses and mules. Hither all the gold and silver is brought to be coined; here the king's fifth is to be deposited; and all that immense quantity of plate wrought which is annually sent into Europe. Lon. 100. 34 W. Lat. 20. 2 N.

Mexico (New), a large country of North America, bounded on the W. by the gulf of California, on the S. by New Spain, on the E. by Louisiana, and on the N. by unknown countries, so that its extent cannot be ascertained. Great encomiums have been lavished on the fertility of its soil, the richness of its mines, and the variety of its valuable products; and with respect to the favourableness of the climate, it may be sufficient to say, that this country lies within the temperate zone. It is chiefly inhabited by native Americans, hitherto unsubdued by the Spaniards. Santa Fé is the capital.

Mexico (Gulf of), that part of the Atlantic ocean, on the coast of North America, bounded on the S. and W. by Mexico, and on the N. by W. and E. Florida; the entrance lying to the E. between the S. coast of E. Florida, and the N.E. point of Jucatan.

MEYENBERG, a town of Upper Saxony, in the marche of Pregnitz, 21 miles N.E. of Perleberg, and 60 N.N.W. of Berlin. Lon. 12. 19 E. Lat. 53. 20 N.

MEYENFELDT, a town in the country of the Grisons, seated on the Rhine, in a pleasant country, fertile in excellent wine, 15 miles N.E. of Coire. Lon. 9. 36 E. Lat. 47. 2 N.

MEYER (James), a Flemish historian, born in 1491, near Bailleul, whence he is sometimes called Baliolianus. He was rector of Blankenberg, and died in 1552. His works are, 1. Annales Rerum Flandricarum, folio. 2. Flandricarum Rerum Decas, 4to.

MEYRVEIS, a town of France, in the department of Loziere, 23 miles S. of Mende, and 27 W. of Alais. Lon. 3. 18 E. Lat. 44. 10 N.

MEZANA, a town of Naples, in Basilicata, 17 miles S.S.W. of Tursi.

MEZEMNA, a seaport of Fez, on the coast of the Mediterranean, 80 miles E. of Tetuan. Lon. 4. 1 W. Lat. 35. 22 N.

MEZEN, a seaport of Russia, in the government of Archangel, near the White sea, at the mouth of a river of the same name, 128 miles N.N.E. of Archangel. Lon. 43. 34 E. Lat. 66. 30 N.

MEZERAY (Francis Eudice de), an eminent French historian, was born at Rye, in

Lower Normandy, in 1610. He was the son of Isaac Eudes, a surgeon; but took the surname of Mezeray from a hamlet near Rye. Having performed his studies at Caen, he evinced a strong inclination to poetry: but going to Paris, he, by the advice of one of his friends, applied himself to the study of politics and history, and procured the place of commissary at war, which he held for two campaigns. He then shut himself up in the college of St. Barbe, in the midst of books and manuscripts; and in 1643 published the first volume of the History of France, in folio; and some years after, the other two volumes. Mezeray in that work surpassed all who had written the history of France before him, and was rewarded by the king with a pension of 4000 livres. In 1668 he published an abridgment of his History of France, in 3 volumes 4to. which was well received by the public: but as he inserted in that work the origin of most of the taxes, with very free reflections, Mr. Colbert complained of it, when Mezeray promised to correct what he had done in a second edition; but those corrections being only palliations, the minister caused half of his pension to be suppressed. Mezeray complained of this in very severe terms; when he obtained no other answer than the suppression of the other half. Vexed at this treatment, he resolved to write on subjects that could not expose him to such disappointments; and composed his treatise on the origin of the French, which did him much honour. He was elected perpetual secretary to the French academy, and died in 1683. He is said to have been a man extremely negligent in his person; and so careless in his dress, that he might have passed for a beggar rather than for what he was. He was actually seized one morning by the *archers des pauvres*, or parish-officers; which mistake was so far from provoking him, that he was highly diverted with it, and told them, that "he was not able to walk on foot, but that as soon as a new wheel was put to his chariot, he would attend them wherever they thought proper." He used to study and write by candle-light, even at noonday in summer; and, as if there had been no sun in the world, always waited upon his company to the door with a candle in his hand. With regard to religion, he affected Perrhonism; which however was not, it seems, so much in his heart as in his mouth. This appeared from his last sickness: for, having sent for those friends who had been the most usual witnesses of his licentious talk about religion, he made a sort of recantation, which he concluded with desiring them "to forget what he might formerly have said upon the subject of religion, and to remember, that Mezeray dying was a better believer than Mezeray in health." Besides his history, he also wrote, 1. A continuation of the history of the Turks. 2. A French translation of John de Sarisbury's Latin treatise on the vanities of the court. 3. There are attributed to him several satires against the government; and in particular, those that bear the name of Sandricourt.

MEZEREON, or MEZEREUM, in botany. See DAPHNE.

MEZEREON. Spurge olive. Widow-wail. This plant, the Daphne mezereum of Linnéus, Daphne floribus sessilibus ternis caulinis, foliis lanceolatis deciduis, is extremely acrid, especially when fresh, and if retained in the mouth, excites great and long continued heat and inflammation, particularly of the mouth and fauces: the berries also have the same effects, and when swallowed, prove a powerful corrosive poison, not only to man, but to dogs, wolves, and foxes. The bark of the root is the part employed medicinally in the decoctum sarsaparillæ compositum, to assist mercury in resolving nodes and other obstinate symptoms of siphilis. The antisiphilitic virtues of mezereum, however, have been by many writers very justly doubted. "The result of my own experience (says Mr. Pearson of the Lock Hospital), by no means accords with the representation given of this root by former writers. From all that I have been able to collect, in the course of many years observation, I feel myself authorized to assert unequivocally, that the mezereum has not the power of curing the venereal disease in any one stage, or under any one form. If a decoction of this root should ever reduce a venereal node, where no mercury has been previously given, yet the patient will by no means be exempted from the necessity of employing mercury, for as long a space of time, and in as large a quantity, as if no mezereum had been taken. With respect to the power it is said to possess, of alleviating the pain, and diminishing the bulk of membranous nodes, nothing peculiar and appropriate can be ascribed to the mezereum on these accounts, since we obtain the same good effects from sarsaparilla, guaicum, volatile alkali, blistering plasters, &c. Nevertheless, venereal nodes which have subsided under the use of any of these articles of the materia medica, will appear again, and often with additional symptoms, if a full and efficacious course of mercury be not submitted to. It has indeed been alleged, that mezereum always alleviates the pain occasioned by a venereal node, and generally reduces it, where the periosteum only is affected; and that it seldom fails of removing those enlargements of the periosteum which have not yielded during the administration of mercury.

"That some instances of success, in cases like these, may have fallen to the share of those who made the assertion, it would not become me to deny; but I have met with few such agreeable evidences of the efficacy of this medicine. I have given the mezereum in the form of a simple decoction, and also as an ingredient in compound decoctions of the woods, in many cases, where no mercury had been previously employed, but never with advantage to a single patient. I have also tried it in numerous instances, after the completion of a course of mercury; yet, with the exception of two cases, where the thickened state of the periosteum was removed during the exhibition of it, I never saw the least benefit derived from taking this medicine,

In a few cases of anomalous pains, which I supposed were derived from irregularities during a mercurial course, the mezereum was of service, after I had tried the common decoction of the woods without success; but even in this description of cases I have always found it a very uncertain remedy.

"I have made trial of this vegetable in a great number of scrophulous cases, where the membranes covering the bones were in a diseased state, and I am not sure that one single patient obtained any evident and material benefit from it.

"The late Dr. Cullen, whose reports may justly claim attention from all medical men, when treating of the mezereum, in his materia medica, says, 'I have frequently employed it in several cutaneous affections, and sometimes with success.' It were to have been wished, that the professór of medicine had specified what those diseases of the skin were, in which the mezereum was sometimes employed with success; for, if I except an instance of two of lepra, in which the decoction of this plant conferred a temporary benefit, I have very seldom found it possessed of any medicinal virtue, either in siphilis, or in the sequelæ of that disease, in scrophula, or in cutaneous affections. Indeed the mezereum is of so acrimonious a nature, often producing heat and other disagreeable sensations in the fauces, and on many occasions, disordering the primæ viæ, that I do not often subject my patients to the certain inconveniences which are connected with the primary effects of this medicine, as they are rarely compensated by any other important and useful qualities."

MEZIERES, a town of France, in the department of Ardennes and late province of Champagne, with a citadel, seated on the Meuse, 12 miles N.W. of Sedan, and 127 N.E. of Paris. Lon. 4. 48 E. Lat. 49. 46 N.

MEZIRIAC (Claude Gaspar Backet Sieur de), one of the most ingenious men of the 17th century, was born at Bresse, of an ancient and noble family. He was a good poet in French, Italian, and Latin; an excellent grammarian, a great Greek scholar, and an admirable critic. He was well versed in the controversies, both in philosophy and religion; and was deeply skilled in algebra and geometry, of which last he gave proof by publishing the six books of Diophantes, enriched with a very able Commentary and Notes. In his youth he spent a considerable time at Paris and at Rome: at which last place he wrote a small collection of Italian poems, in competition with Vaugelas, who was there at the same time: among which there are imitations of the most beautiful similies contained in the eight first books of the Æneid. He also translated Ovid's Epistles; a great part of which he illustrated with very curious commentaries of his own. While he was at Paris, they talked of making him preceptor to Louis XIII.: upon which he left the court in great haste, and afterwards declared that he had never felt so much pain upon any occasion of his life; for he seemed to have already upon his shoulders the important weight of the whole kingdom. He undertook the translation of all Plutarch's works, with notes; which he had brought nearly to a conclusion, when he died at Bourg, in Bresse, anno 1638, at 45 years of age. He left behind him several finished works that were not printed.

MEZUZOTH, in the Jewish customs, certain pieces of parchment which the Jews fix to the door-posts of their houses, taking that literally which Moses commands them, saying, "Thou shalt never forget the laws of thy God, but thou shalt write them upon the posts of thy house, and on thy gates." This expression means nothing else, but that thou shalt always remember them, whether thou comest into thy house or goest out.

MEZZA BRAVURA, in music, an expression used by the Italians to signify an air of moderate passion and execution.

Mezza voce. (Ital.) An expression signifying that the movement before which it is written is to be sung or played with a moderate strength of tone, and in a delicate, pleasing manner.

Mezzo. (Ital.) Half, middle, mean. This word is generally used in conjunction with some other: as *mezzo forte*, moderately loud; *mezzo piano*, rather soft. When written alone, and applied to the grand piano-forte, it denotes that the pedal is to be used, taking off one of the sets of strings.

Mezzo soprano. (Ital.) A treble voice of a moderate, or somewhat low scale.

MEZZOTINTO, a particular manner of representing figures on copper, so as to form prints in imitation of painting in Indian ink. (See Engraving.) The invention of this art has been usually attributed to prince Rupert. But baron Heinikin, a very judicious and accurate writer upon the subject of engraving, asserts, with great appearance of truth, that it was a lieutenant-colonel de Siegan, an officer in the service of the landgrave of Hesse, who first engraved in this manner; and that the print which he produced was a portrait of the princess Amelia Elizabeth of Hesse, engraved in the year 1643. Prince Rupert learned the secret from this gentleman, and brought it into England when he came over the second time with Charles II. Prince Rupert's print of an executioner holding a sword in one hand and a head in the other, a half length, from Spagnoletto, is dated 1658. This art has never been cultivated with success in any country but England.

The prince laid his grounds on the plate with a channelled roller; but one Sherwin, about the same time, laid his grounds with a half-round file, which was pressed down with a heavy piece of lead. Both these grounding tools have been laid aside for many years; and a hand-tool, resembling a shoemaker's cutting-board-knife, with a fine crenelling on the edge, was introduced by one Edial, a smith by trade, who afterwards became a mezzotinto painter.

It is very different from the common way of engraving. To perform it, they rake, hatch,

or punch, the surface of the plate all over with a knife, or instrument made for the purpose, first one way, then the other, across, &c. till the surface of the plate be thus entirely furrowed with lines or furrows, close and as it were contiguous to each other; so that, if an impression was then taken from it, it would be one uniform blot or smut. This done, the design is drawn or marked on the same face; after which, they proceed with burnishers, scrapers, &c. to expunge and take out the dents or furrows, in all the parts where the lights of the piece are to be; and that more or less as the lights are to be stronger or fainter; leaving those parts black which are to represent the shadows or deepenings of the draught.

As it is much easier to scrape or burnish away parts of a dark ground corresponding with the outline of any design sketched upon it, than to form shades upon a light ground by an infinite number of hatches, strokes, and points, which must all terminate with exactness on the outline, as well as differ in their force and manner; the method of scraping, as it is called, in mezzotinto, consequently becomes much more easy and expeditious than any other method of engraving. The instruments used in this kind of engraving are cradles, scrapers, and burnishers.

In this engraving, the plate must be prepared and polished in the same manner as for other engraving; and afterwards divided equally by lines parallel to each other, and traced out with very soft chalk.—The distance of these lines should be about one-third of the length of the face of the cradle which is to be used, and these lines should be marked with capital letters, or strokes of the chalk. The cradle is then to be placed exactly betwixt the two first lines, and passed forwards in the same direction; being kept as steady as possible, and pressed upon with a moderate force. The same operation must be repeated with respect to all the other lines, till the instrument has thus passed over the whole surface of the plate.—Other lines must be then drawn from the extremities of the other two sides, in the same manner; which, intersecting the first at right angles, will with them form squares; and the same operation must be repeated with the cradle as in the case of the first. New lines must then be drawn diagonally, and the cradle passed betwixt them as before; and when the first diagonal operation is performed, the lines must be crossed at right angles as the former, and the cradles passed betwixt them in the same manner.—The plate having undergone the action of the cradle, according to the disposition of the first order of lines, a second set must be formed, having the same distances from each other as the first. But they must be so placed as to divide those already made into spaces one-third less than their whole extent; i. e. every one after the first on each side will take in one-third of that before it, *e. g.* beginning at A, of which the first third must be left out; a third of B will consequently be taken in, and so of the rest. These lines of the second order must be marked with small letters, or lesser strokes to distinguish them from the first: and the same treatment of the plate must be pursued with respect to them as was practised for the others. When this second operation is finished a third order of lines must be made; the first of which, *e. g.* in A, must omit two-thirds of it, and consequently take in two-thirds of B, &c. By these means, the original spaces will be exactly divided into equal thirds; and the cradle must be again employed betwixt these lines as before.—When the whole of this operation is finished, it is called *one turn*; but in order to produce a very dark and uniform ground, the plate must undergo the repetition of all these several operations for above twenty times; beginning to pass the cradle again betwixt the first lines, and proceeding in the same manner through all the rest. When the plate is prepared with a proper ground, the sketch must be chalked on it, by rubbing the paper on the backside with chalk. It is also proper to overtrace it afterwards with black lead or Indian ink. The scraping is then performed, by paring or cutting away the grain of the ground in various degrees; so that none of it is left in the original state except in the touches of the strongest shade. The general manner of proceeding is the same as drawing with white upon black paper. The masses of light are first begun with; and those parts which go off into light in their upper part, but are brown below; the reflections are then entered upon; after which the plate is blackened with a printer's blacking-ball made of felt, in order to discover the effect: and then the work is proceeded with; observing always to begin every part in the places where the strongest lights are to be.

The act of scraping mezzotintoes has been applied to the printing with a variety of colours, in order to produce the resemblance of paintings. The inventor of the method of doing this was J. C. Le Blon, a native of Frankfort, and pupil of Carlo Maratti, between the years 1720 and 1730. It was established by the inventor on this principle, that there are three primitive colours, of which all the rest may be composed by mixing them in various proportions; that any two of these colours being mixed together, preserve their original power, and only produce a third colour such as their compound must necessarily give; but if transparent colours be mixed, and three primitive kinds compounded together, they destroy each other, and produce black, or a tendency to it, in proportion to the equality or inequality of the mixture; and that if, therefore, these three colours be laid, either separately or upon each other, by three plates, engraved correspondently on these principles to the colouring of the design, the whole variety of teints necessary may be produced. The requisites, therefore, to the execution of any design in this method of printing are as follow: 1. To settle a plan of the colouring to be imitated; showing where the presence of each of the three simple colours is necessary, either in its pure state or combined with some other, to

produce the effect required; and to reduce this plan to a painted sketch of each, in which not only the proper outlines, but the degree of strength should be expressed. 2. To engrave three plates according to this plan, which may print each of the colours exactly in the places where, and proportion in which they are wanted. 3. To find three transparent substances proper for printing with these three primitive colours. The manner in which Mr. Le Blon prepared the plates was as follows: The three plates of copper were first well fitted with respect to size and figure to each other, and grounded in the same manner as those designed for mezzotinto prints; and the exact place and boundary of each of the three primitive colours, conformably to the design, were sketched out on three papers, answering in dimensions to the plate. These sketches were then chalked on the plates; and all the parts of each plate that were not to convey the colour to which it was appropriated to the print were entirely scraped away, as in forming the light of mezzotinto prints. The parts that were to convey the colours were then worked upon; and where the most light or diluted teints of the colour were to be, the grain in the ground was proportionably taken off; but where the full colour was required, it was left entire. In this regard was had, not only to the effects of the colour in its simple state, but to its combined operation, either in producing orange-colour, green, or purple, by its admixture with one alone; and likewise to its forming brown, grey, and shades of different degrees, by its co-operation with both the others. But though the greatest part of the engraving was performed in the mezzotinto manner, yet the graver was employed occasionally for strengthening the shades, and for correcting the outline where it required great accuracy and steadiness. It was found necessary sometimes to have two separate plates for printing the same colour, in order to produce a stronger effect: but the second plate, which was used to print upon the first, was intended only to glaze and soften the colours in particular parts that might require it. See ENGRAVING.

MIASMA. (from μιαινω, to pollute.) Miasms, as they relate to the diseases both of human and brute animals, are productive of some of the febrile kinds, and of them only, as in the case of contagion. They are generally floating in the atmosphere, but not observed to act except when a healthy animal approaches the sources whence they arise. The idea of contagion properly implies a matter arising from a body under disease; and that of miasma a matter arising from other substances, as from putrifying vegetables, &c. See SEPTON.

Dr. Cullen remarks, that the substances imbued with the effluvia from the bodies of the diseased may be called fomites; and that it is probable that contagions, as they arise from fomites, are more powerful than as they arise immediately from the human body. Further, that though the fomites are possessed of matter from the human body, yet this matter passing from the fomites is called miasma; which requires further to be distinguished from the miasmata arising from marshes, &c. by the epithets human and marsh miasmata.

On this subject of contagion and miasma Dr. Cullen's observations have their value, as being applicable to the theory of contagious diseases in brutes. He says, as fevers are so generally epidemic, it is probable that some matter floating in the atmosphere, and applied to the bodies of men, ought to be considered as the remote cause of fevers. Contagions have been supposed to be of great variety, and it is possible that they may be so; but that they truly are, does not appear clearly from any thing that we know at present. The number of genera and species of contagious diseases, of the class pyrexiæ, at present known, is not very great. They belong to the order of fevers, of exanthemata, or of profluvia. Whether there be any belonging to the order of phlegmasiæ is doubtful; and, though it should be supposed, it will not much increase the number of contagious pyrexiæ. Of the contagious exanthemata and profluvia, the number of species is nearly ascertained; and each of them is so far of a determined nature, that though they have now been observed and distinguished for many ages, and in many different parts of the earth, they have been always found to retain the same general character, and to differ only in circumstances, which may be imputed only to season, climate, and other external causes, or to the peculiar constitution of the several persons affected. It is therefore probable, that in each of these species the contagion is of one specific nature, and that the number of the contagious exanthemata, or profluvia, is hardly greater than the number of species taken notice of in his system of nosology. While the contagious exanthemata and profluvia are thus limited, it is probable that the contagions which produce the continued fevers are not many; nay, it is not evident that there are more than one common source of them. It is well known that the effluvia constantly arising from the living human body, if long retained in the same place, without being diffused in the atmosphere, acquire a singular virulence, and, in that state, applied to the bodies of men, become the cause of a fever which is very contagious. The late observations on jail and hospital fevers have fully proved the existence of such a cause; and it is sufficiently obvious that the same virulent matter may be produced in many other places. At the same time, the nature of the fevers arising renders it probable that the virulent state of human effluvia is the common cause of such fevers, as they differ only in a state of their symptoms, which may be imputed to the circumstances of season, climate, &c. concurring with the contagion, and modifying its force.

Miasmata arise from various sources, and are of different kinds; but we know little of their variety or of their several effects. We know with certainty only one species of miasma

which can be considered as the cause of fever; and, from the universality of this, it may be doubted if there be any other. The miasma, so universally the cause of fever, is that which arises from marshes or moist ground, acted upon by heat. So many observations have now been made with respect to this, in so many different regions of the earth, that there is neither any doubt of its being in general the cause of fevers, nor of its being very universally the cause of intermittent fevers in all their different forms. The similarity of the climate, season, and soil, in which intermittents arise, and the similarity of the diseases arising in different regions, concur in proving that there is one common cause of these diseases, and that this is the marsh miasma. What is the particular nature of this miasma we know not; nor do we certainly know whether or not it differs in kind: but it is probable that it does not, and that it differs only in the degree of its power, or perhaps in its quality, in a given space.

MICA. In mineralogy, a genus of the class earths, order argillaceous. Consisting of silica and alumina, with a small proportion of oxyd of iron, and generally a little magnesia and lime; glabrous, meagre, shining, spontaneously falling into glanular fragments, easily breaking into discoid fragments, lightish, parasitical; fusible before the blow-pipe into a white or coloured enamel. Nine species.

1. M. membranacea. Glimmer: Glist: Muscovy talc. Transparent, with large, parallel, elastic, easily separable plates. Found in Malabar, Siberia, Russia, Finland, France, and near Geneva, in large plates which are often substituted for glass; and consists of a great number of thin transparent laminæ adhering together; easily distinguished from gypsum speculare, or glaciale, from their great degree of flexibility; texture foliated; fragments flat; lustre metallic; very rough; often absorbs water; feels smooth, but not greasy; spec. grav. from 2,6546 to 2,9342:

| | |
|---|---|
| contains silica . . . | 50,00 |
| alumina . . . | 35,00 |
| oxyd of iron . . | 7,00 |
| magnesia . . . | 1,35 |
| lime . . . . | 1,33 |
| | 94,68 |
| Undecided | ,32 |
| | 100, |

2. M. laminosa. Fissile, or semipellucid membranaceous mica. Transparent, coloured, with large, parallel, easily separable plates. Found principally in the granites of primæval mountains, generally smoke-colour or black, sometimes brown, gold, red or white, and very rarely concreted in masses resembling pieces of shale.

3. M. squamosa. Scaly mica. Somewhat opake, with less, scattered, incurved foliations; one variety, of a silvery colour; another of a golden. Found every where in granite and other stones, intermixed among their component parts, in almost innumerable hues and colours, but generally with a coppery, silvery, or gold metallic lustre.

4. M. undulata. Wavy mica. Fissile mica. One variety, with undulate gold foliations; another with flexuous brittle gold foliations. Found in the mines of Dalecarlia.

5. M. hemisphærica. Hemisphæric mica. With hemisphæric concentric foliations. Found in Finland, in the hamlet Kimito, constituting a component part of decaying rock, white, very shining, and resembling in bulk and figure the half of a split-pea.

6. M. striata. Striated mica, with the foliations radiating. Found in Saxony in stones cinereous or black, becoming whitish or yellowish in the fire, and approaching nearly to a hornblend.

7. M. crystallina. Crystal mica. In six-sided tubles. Found in the mines of Dalecarlia, in Salsburg and Zinnwalden; the tubles sometimes scattered, sometimes aggregate, in a stellate manner, or disposed in columns.

8. M. prismatica. Prismatic mica. Brown, in nine-sided prisms. Found in the mines of Saxony, near Schneeberg, in rock composed of quartz and feldspar, opake, a little shining within.

9. M. lepidolithus. Lepidolite: Lilalite. With scattered, flat, cohering, pale violet scales. Found in Moravia and Sudermania, mixed with granite in large amorphous masses, composed of thin plates which easily separate; colour of the mass violet-blue, of the thin plates silvery white; powder white, with a pale red tinge; before the blow-pipe it froths, and melts easily into a white semitransparent enamel, full of bubbles; dissolves in borax with effervescence, and communicates no colour to it.

MICAH, or, The book of MICAH, a canonical book of the Old Testament, written by the prophet Micah, who is the seventh of the twelve prophets. He is cited by Jeremiah, and prophesied in the days of Jotham, Ahaz, and Hezekiah. He censures the reigning vices of Jerusalem and Samaria, and denounces the judgments of God against both kingdoms. He likewise foretels the confusion of the enemies of the Jews, the coming of the Messiah, and the glorious success of his church.

MICE. The plural of *mouse*.

MICHA, a cape of Dalmatia, which advances into the gulf of Venice, near the town of Zara.

MICHAEL (St.), the most fertile and populous of the Azores or Western Islands. Its two principal harbours are Punta Guda and Villa Franca: the former is the capital of the island. Lon. 25. 42 W. Lat. 37. 47 N.

MICHAEL (St.), a borough in Cornwall, which has neither market nor fair, but sends two members to parliament. It is eight miles S.W. of St. Columb, and 249 W. by S. of London. Lon. 4. 52 W. Lat. 50. 23 N.

MICHAEL (St.), a town of France, in the department of Meuse, remarkable for its hospital, and the rich library of a late Benedictine

abbey. It is seated on the Meuse, 20 miles N.E. of Bar-le-Duc, and 165 E. of Paris. Lon. 5. 38 E. Lat. 48. 51 N.

MICHAEL (St.), a seaport of New Spain, in the province of Guatimala, seated on a small river, 180 miles S.E. of New Guatimala. Lon. 87. 45 W. Lat. 12. 25 N.

MICHAEL (St.), a town of Peru, in the province of Quito. It was the first Spanish colony in Peru, and is seated near the mouth of the Piura, 225 miles S. by W. of Quito. Lon. 80. 50 W. Lat. 5. 0 S.

MICHAEL DE IBARRA (St.), a town of Peru, in the province of Quito, 60 miles N.E. of Quito.

MICHAEL (Gulf of St.), to the E. of Panama, that part of the Pacific ocean which was first discovered by the Spaniards, after their march across the isthmus of Darien.

MICHAELIS (John David), a celebrated biblical critic, and author of many esteemed works, was the eldest son of Dr. Christian Benedict Michaelis, professor in the university of Halle in Lower Saxony, and was born at that place Feb. 27, 1717. His father devoted him at an early age to an academical life; and with that view he received the first part of his education in a celebrated Prussian seminary, called the Orphan-house, at Glanche, in the neighbourhood of his native place. He commenced his academical career at Halle in 1733, and took his master's degree in the faculty of philosophy in 1739. In 1741 he made an excursion to this country, where his superior knowledge of the oriental languages, which was considerably increased by his indefatigable researches in the Bodleian library at Oxford, introduced him to the acquaintance, and gained him the esteem, of our first literary characters; with several of whom, and particularly bishop Lowth, he was in correspondence for many years. On his return to Halle, after an absence of fifteen months, he began to read lectures on the historical books of the Old Testament, which he continued after his removal to Gottingen in 1745. In 1746 he was appointed professor extraordinary, and soon after professor of philosophy in that university. The next year he obtained a place as secretary to the royal society there, of which he was director in 1761, and was soon afterwards made Aulic counsellor by the court of Hanover. In 1764, his distinguished talents, but chiefly a publication relative to a journey to Arabia, which was undertaken by several literary men, at the expence of the king of Denmark, in consequence of his application by means of count Bernsdorff, procured him the honour of being chosen a correspondent, and afterwards foreign member of the academy of inscriptions at Paris, of whom the institution admitted only eight; and in the same year he became a member of the society of Haarlem. In 1775, count Hopkin, who eighteen years before had prohibited the use of his writings at Upsal, when he was chancellor of that university, prevailed upon the king of Sweden to confer on him the order of the polar star, as a national compensation. In 1786 he was raised to the distinguished rank of privy counsellor of justice by the court of Hanover; and in 1788 received his last literary honour, by being unanimously elected a fellow of the royal society of London. His great critical knowledge of the Hebrew language, which he displayed in a new translation of the Bible, and in other works, raised him to a degree of eminence almost unknown before in Germany; and his indefatigable labours were only equalled by his desire of communicating the knowledge he acquired to the numerous students of all countries who frequented his admirable lectures; which he continued to deliver on various parts of the sacred writings in half-yearly courses, and on the Hebrew, Arabic, and Syriac languages, to the last year of his life. He was professor in the university of Gottingen forty-five years, and, during that long period, he filled the chair with dignity, credit, and usefulness. He died October 22, 1791, aged 74. He is said to have left behind him several valuable MSS. Of the works that were published during his life-time, and which are very numerous, a catalogue, in the order of their publication, is given in the Gentleman's Magazine, for March 1792. Michaelis's Lectures on the New Testament have been admirably translated by Dr. Herbert Marsh, and enriched with many valuable notes.

MICHAELMAS, or Feast of St. Michael and all Angels, a festival of the Christian church, observed on the 29th of September.

MICHAELMAS DAISY. In botany. See ASTER.

MICHA'UXIA. In botany, a genus of the class octandria, order monogynia. Calyx sixteen-parted; corol wheel-shaped, eight-parted; nectary eight-valved, bearing the stamens; capsule eight-celled, many-seeded. One species; a native of the Levant, with herbaceous stem, and white pendulous flowers.

*To* MICHE. *v. n.* To be secret or covered; to lie hid (*Hanmer*).

MICHE'LIA. In botany, a genus of the class polyandria, order polygynia. Calyx three-leaved; petals fifteen; berries numerous, four-seeded. Two species: Indian trees, as follow:

1. M. champaca. Leaves lanceolate, with yellow and very fragrant flowers.

2. M. tsiampaca. Leaves lanceovate; with a fine silky down, and whitish flowers.

MICHELONIA, a country of Prussia, which is part of the circle of Culm, and separated from the other part by the river Dribents. It takes its name from the castle of Michelow.

MICHIGAN, a considerable lake of North America, whose N.E. extremity communicates with the N.W. end of Lake Huron by the strait of Michillimackinac.

MI'CHER. *s.* (from *miche.*) A lazy loiterer, who skulks about in corners and by-places; a hedge-creeper (*Sidney*).

MI'CKLE. *a.* (micel, Saxon.) Much; great; muckle (*Camden*).

MICKLE (William Julius), a Scotch poet,

born at Langholm in Dumfriesshire, in 1734. He was educated at the high school, Edinburgh, after which he became a weaver in that city. Not succeeding in that business, he came to England, and was for some time corrector at the Clarendon press, Oxford, where he produced several poems. His greatest work was his translation of the Lusiad, from the Portuguese of Camoens, 4to. Oxford, 1775. A second edition appeared in 1778, and procured the author more reputation than profit. In 1781 he went to Lisbon as secretary to governor Johnstone, and while there wrote his poem, entitled Almada Hill. The patronage of the governor rendered his circumstances comfortable, and on his return to England he entered into the marriage state. He died in 1789. His poems were published in 1794 in in one volume, 4to.

MICRANA. MIGRANA. Corruptions from hemicrania, or pain on one side of the head: and hence perhaps the vulgar term megraims, nervousness, low spirits.

MICROCA'RPON. In botany, a genus of the class cryptogamia, order fungi. Fungus with a membranous case opening irregularly, filled with seminiferous filaments reticulately compact and affixed to the base. One species: M. pallida; an exotic, and the cribraria of several foreign botanists.

MICROCOSM, a Greek term signifying the little world; used by some for man, as being supposed an epitome of the universe or great world.

MICROCO'SMIC BEZOAR. See CALCULUS.

MICROCOSMIC SALT, the compound phosphat of soda and ammonia. It is often used as a test in the analysis of metals.

MI'CROGRAPHY. *s.* (μικρ& and γράφω.) The description of the parts of such very small objects as are discernible only with a microscope (*Grew*).

MI'CROMETER. *s.* (μίκρ& and μετρον.) An instrument by the help of which the apparent magnitudes of objects viewed through telescopes or microscopes are measured with great exactness.

The general principle of this instrument is, that it moves a fine wire, parallel to itself, in the plane of the picture of an object, formed in the focus of a telescope, and thus measures its perpendicular distance from a fixed wire in the same plane.

This instrument was invented about the year 1666; and it has, of course, undergone many improvements since that time. Mr. Gascoigne divided the image of an object, in the focus of the object-glass, by the approach of two pieces of metal, ground to a very fine edge; instead of which, Dr. Hooke would substitute two fine hairs, stretched parallel to each other; and two other methods of Dr. Hooke, different from this, are described in his posthumous works, p. 497, &c. An account of several curious observations which Mr. Gascoigne made by the help of his micrometer, particularly in measuring the diameter of the moon and other planets, may be seen in the Phil. Trans. vol. 48, pa. 190; where Dr. Bevis refers to an original letter of Mr. Gascoigne to Mr. Oughtred, written in 1641, for an account given by the author of his own invention, &c.

Mons. De la Hire, in a discourse on the æra of the inventions of the micrometer, pendulum clock, and telescope, read before the Royal Academy of Sciences in 1717, makes M. Huygens the inventor of the micrometer. That author, he observes, in his Observations on Saturn's Ring, &c. published in 1659, gives a method of finding the diameters of the planets by means of a telescope, viz. by putting an object, which he calls a virgular, of a size proper to take in the distance to be measured, in the focus of the convex object-glass: in this case, says he, the smallest object will be seen very distinctly in that place of the glass. By such means, he adds, he measured the diameter of the planets, as he there delivers them. See Huygens's System of Saturn.

This micrometer, M. De la Hire observes, is so very little different from that published by the marquis de Malvasia, in his Ephemerides, three years after, that they ought to be esteemed the same: and the micrometer of the marquis differed yet less from that published four years after his, by Azout and Picard. Hence, De la Hire concludes, that it is to Huygens the world is indebted for the invention of the micrometer; without taking any notice of the claim of our countryman Gascoigne, which, however, is many years prior to any of them.

De la Hire says, that there is no method more simple or commodious for observing the digits of an eclipse than a net in the focus of the telescope.

These, he says, were usually made of silken threads; and for this particular purpose six concentric circles had also been used, drawn upon oiled paper; but he advises to draw the circles on very thin pieces of glass, with the point of a diamond. He also gives some particular directions to assist persons in using them. In another memoir he shews a method of making use of the same net for all eclipses, by using a telescope with two object-glasses, and placing them at different distances from each other. Mem. 1701 and 1717.

M. Cassini invented a very ingenious method of ascertaining the right ascensions and declinations of stars, by fixing four cross hairs in the focus of the telescope, and turning it about its axis, so as to make them move in a line parallel to one of them. But the later improved micrometers will answer this purpose with greater exactness. Dr. Maskelyne has published directions for the use of it, extracted from Dr. Bradley's papers, in the Philos. Trans. vol. 62. See also Smith's Optics, vol. 2, pa. 343.

Wolfius describes a micrometer of a very easy and simple structure, first contrived by Kirchius.

Dr. Derham tells us, that his micrometer is not put into a tube, as is usual, but is contrived to measure the spectres of the sun on paper, of any radius, or to measure any part of them. By this means he can easily, and very exactly, with the help of a fine thread, take the declination of a solar spot at any time of the day; and, by his half-seconds watch, measure the distance of the spot from either limb of the sun.

J. And. Segner proposed to enlarge the field of view in these micrometers, by making them of a considerable extent, and having a moveable eye-glass, or several eye-glasses, placed opposite to different parts of it. He thought, however, that two would be quite sufficient, and he gives parti-

cular directions how to make use of such micrometers in astronomical observations. See Comm. Gotting. vol. 1, pa. 27.

A considerable improvement in the micrometer was communicated to the Royal Society, in 1743, by Mr. S. Savary; an account of which, extracted from the minutes by Mr. Short, was published in the Philos. Trans. for 1753. The first hint of such a micrometer was suggested by M. Roemer, in 1675: and M. Bouguer proposed a construction similar to that of M. Savary, in 1748; for which see HELIOMETER. The late Mr. Dollond made a farther improvement in this kind of micrometer, an account of which was given to the Royal Society by Mr. Short, and published in the Philos. Trans. vol. 48. Instead of two object-glasses, he used only one, which he neatly cut into two semicircles, and fitted each semicircle into a metal frame, so that their diameters sliding in one another, by means of a screw, may have their centres so brought together as to appear like one glass, and so form one image; or by their centres receding, may form two images of the same object: it being a property of such glasses, for any segment to exhibit a perfect image of an object, although not so bright as the whole glass would give it. If proper scales are fitted to this instrument, shewing how far the centres recede, relative to the focal length of the glass, they will also shew how far the two parts of the same object are asunder, relative to its distance from the object glass; and consequently give the angle under which the distance of the parts of that object are seen. This divided object-glass micrometer, which was applied by the late Mr. Dollond to the object end of a reflecting telescope, and has been with equal advantage adapted by his son to the end of an achromatic telescope, is of so easy use, and affords so large a scale, that it is generally looked upon by astronomers as the most convenient and exact instrument for measuring small distances in the heavens. However, the common micrometer is peculiarly adapted for measuring differences of right ascension and declination of celestial objects, but less convenient and exact for measuring their absolute distances; whereas the object-glass micrometer is peculiarly fitted for measuring distances, though generally supposed improper for the former purpose. But Dr. Maskelyne has found that this may be applied with very little trouble to that purpose also; and he has furnished the directions necessary to be followed when it is used in this manner. The addition requisite for this purpose is a cell, containing two wires, intersecting each other at right angles, placed in the focus of the eye-glass of the telescope, and moveable round about, by the turning of a button. For the description of this apparatus, with the method of applying and using it, see Dr. Maskelyne's paper on the subject, in the Philos. Trans. vol. 61, pa. 536, &c.

After all, the use of the object-glass micrometer is attended with difficulties, arising from the alterations in the focus of the eye, which are apt to cause it to give different measures of the same angle at different times. To obviate these difficulties, Dr. Maskelyne, in 1776, contrived a prismatic micrometer, or a micrometer consisting of two achromatic prisms, or wedges, applied between the object-glass and eye-glass of an achromatic telescope, by moving of which wedges nearer to or farther from the object-glass, the two images of an object produced by them appeared to approach to, or recede from, each other, so that the focal length of the object-glass becomes a scale for measuring the angular distance of the two images. The rationale and use of this micrometer are explained in the Philos. Trans. vol. 67, pa. 799, &c. And a similar invention by the abbé Rochon, and improved by the abbé Boscovich, was also communicated to the Royal Society, and published in the same volume of the Transactions, pa. 789, &c.

Mr. Ramsden has lately described two new micrometers, which he has contrived for remedying the defects of the object-glass micrometer. One of these is a catoptric micrometer, which, besides the advantage it derives from the principle of reflection, of not being disturbed by the heterogeneity of light, avoids every defect of other micrometers, and can have no aberration, nor any defect arising from the imperfection of materials, or of execution; as the great simplicity of its construction requires no additional mirrors or glasses, to those required for the telescope; and the separation of the image being effected by the inclination of the two specula, and not depending on the focus of lens or mirror, any alteration in the eye of an observer cannot affect the angle measured. It has peculiar to itself the advantages of an adjustment, to make the images coincide in a direction perpendicular to that of their motion; and also of measuring the diameter of a planet on both sides of the zero; which will appear no inconsiderable advantage to observers who know how much easier it is to ascertain the contact of the external edges of two images than their perfect coincidence.

The other micrometer invented and described by Mr. Ramsden, is suited to the principle of refraction. This micrometer is applied to the erect eye-tube of a refracting telescope, and is placed in the conjugate focus of the first eye-glass, as the image is considerably magnified before it comes to the micrometer, any imperfection in its glass will be magnified only by the remaining eye-glasses, which in any telescope seldom exceeds five or six times; and besides, the size of the micrometer glass will not be the one hundredth part of the area which would be required, if it were placed at the object-glass; and yet the same extent of scale is preserved, and the images are uniformly bright in every part of the field of the telescope. See the description and construction of these two micrometers in the Philos. Trans. vol. 69, part 2, art. 27.

In vol. 72 of the Philos. Trans. for the year 1782, Dr. Herschel, after explaining the defects and imperfections of the parallel-wire micrometer, especially for measuring the apparent diameter of stars, and the distances between double and multiple stars, describes one for these purposes, which he calls a lamp micrometer; one that is free from such defects, and has the advantage of a very enlarged scale. In speaking of the application of this instrument, he says, "It is well known to opticians and others, who have been in the habit of using optical instruments, that we can with one eye look into a microscope or telescope, and see an object much magnified, while the naked eye may see a scale upon which the magnified picture is thrown. In this manner I have generally determined the power of my telescopes; and any one who has acquired a facility of taking such observations will very seldom mistake so much as one in fifty in determining the power of an instrument, and that degree of exactness is fully sufficient for the purpose.

"The Newtonian form is admirably adapted to the use of this micrometer; for the observer stands

always erect, and looks in a horizontal direction, notwithstanding the telescope should be elevated to the zenith.—The scale of the micrometer at the convenient distance of ten feet from the eye, with the power of four hundred and sixty, is above a quarter of an inch to a second; and by putting on my power of nine hundred and thirty-two, I obtain a scale of more than half an inch to a second, without increasing the distance of the micrometer; whereas the most perfect of my former micrometers, with the same instrument, had a scale of less than the two hundredth part of an inch to a second.

"The measures of this micrometer are not confined to double stars only, but may be applied to any other objects that require the utmost accuracy, such as the diameters of the planets or their satellites, the mountains of the moon, the diameters of the fixed stars, &c."

We shall now give an account of a micrometer by Mr. Troughton, which is applied to the eye-piece of a telescope to measure exceedingly small angles, as the diameter of the heavenly bodies, &c. Plate 103, fig. 6, is an orthography projecting endways; fig. 7, a section of the box containing the wires; and fig. 8, a section lengthways: the same letters, as far as they can, are used in all the figures. Figs. 6 and 8, A is an eye-tube containing a convex lens at each end, this slides in another tube, *d d*, so as to adjust the glass to distinct vision of the wires, the tube, *d d*, is screwed into another, *b b*, which is much larger, through this a thin long box, D D D, containing the wire slides. The micrometer is screwed to the telescope by a male screw, *e e*, (fig. 8.) in the same piece with which is a circular plate, *f f*, cut all round with fine teeth, this plate fits against the flat bottom of the box, *b*, and turns round concentrically with it by means of a ring, *k*, fitting into a conical hole in the centre of the plate, *f f*, and screwed to the box; a small endless screw, *h*, (fig. 6.) turning in two brass collars screwed to the box, *b*, works in the teeth cut round the plate, *f*, and by that means when the milled head on the arbor of the endless screw is turned, it turns the eye-tube and box, D D, round, to bring it to any convenient position for measuring the angles required; the box containing the wires is shewn open in fig. 7, it containing two frames, *h b b*, and *l l l*, one sliding within another, which moves in the box, without lateral shake, yet fitted so as to slide easily backwards and forwards in the box, by the screws, *m* and *n*, in the same manner as the microscope in the upper part of the same plate; *o* and *p* are springs to counteract the screws and make the motion pleasant. A wire is stretched across the frame, *h k*, at right angles to its sides, and another of the same size is fixed across the slider, *l l l*, exactly parallel to the former; a small quantity of the underside of the latter is cut away, and its wire is fixed in another plane to the wire of *h h h*, so that the wires can pass each other without touching, but as near as possible; when they are placed by their screws over each other, and viewed through the eye-tube, they appear but as one wire: the divided circle, *x*, on the nuts of screws are then slipped round, without the screw, to bring the first division on them to the index *l*; the instrument is now adjusted for observing any angle, it is screwed to the telescope, and by the endless screw, *h*, (fig. 6.) the micrometer is turned round so as to bring a fixed wire, *w*, which is perpendicular to the others, to cover the two objects; the two wires are then separated by turning either of the nuts, F, until the wires include the angle to be measured: the whole box (fig. 7.) of the micrometer slides through the tube, in the direction of its length, to follow any moving object. When the observation is completed, it is read off by a scale of notches in the box, (fig. 7.) determining the number of revolutions the screw has made, and the divisions pointed out on the circles, *x*; by the indexes, *l l*, the number of aliquot parts is denoted; the circular plate, *f f*, is divided into degrees as shewn in fig. 6, and it is by this that the angle line measured makes with the horizon is registered.

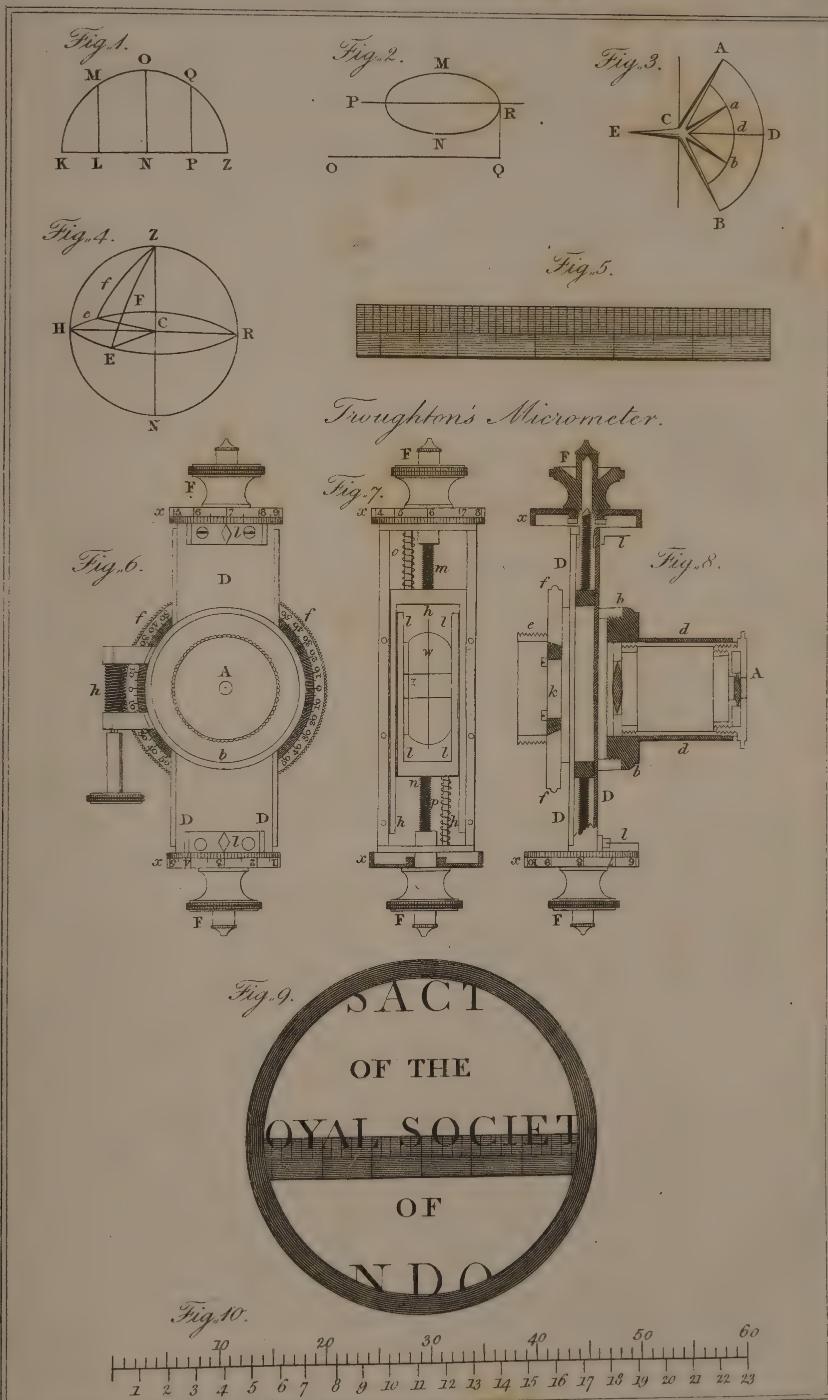
The circles are divided in one hundred parts, and have no determinate value in angular measurement, but their value is determined experimentally by observing through the telescope; it is applied to the diameter of the sun, or any other body whose angular measure has been previously and accurately determined by some other divided instrument, and from this the angle given by each observation is calculated.

The micrometer has not only been applied to telescopes, and employed for astronomical purposes; but there have been various contrivances for adapting it to microscopical observations. M. Leeuwenhoek's method of estimating the size of small objects, was by comparing them with grains of sand, of which one hundred in a line took up an inch. These grains he laid upon the same plate with his objects, and viewed them at the same time. Dr. Jurin's method was similar to this; for he found the diameter of a piece of fine silver wire, by wrapping it very close upon a pin, and observing how many rings made an inch: and he used this wire in the same manner as Leeuwenhoek used his sand. Dr. Hooke used to look upon the magnified object with one eye, while, at the same time, he viewed other objects at the same distance, with the other eye. In this manner he was able, by the help of a ruler, divided into inches and small parts, and laid on the pedestal of the microscope, as it were to cast the magnified appearance of the object upon the ruler, and thus exactly to measure the diameter which it appeared to have through the glass; which being compared with the diameter as it appeared to the naked eye, easily shewed the degree in which it was magnified. A little practice, says Mr. Baker, will render this method exceedingly easy and pleasant.

Mr. Martin, in his Optics, recommends such a micrometer for a microscope as had been applied to telescopes; for he advises to draw a number of parallel lines on a piece of glass, with the fine point of a diamond, at the distance of one-fortieth of an inch from one another, and to place it in the focus of the eye-glass. By this method Dr. Smith contrived to take the exact draught of objects viewed by a double microscope; for he advises to get a lattice, made with small silver wires or squares, drawn upon a plain glass by the strokes of a diamond, and to put it into the place of the image formed by the object-glass. Then, by transferring the parts of the object seen in the squares of the glass or lattice, upon similar corresponding squares drawn on paper, the picture may be exactly taken.

Mr. Martin also introduced into compound microscopes another micrometer, consisting of a screw.

A very accurate division of a scale is performed by Mr. Coventry of Southwark. The micrometers of his construction are parallel lines drawn on glass, ivory, or metal, from the tenth to the ten-thousandth part of an inch. These may be applied

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to microscopes for measuring the size of minute objects, and the magnifying power of the glasses; and to telescopes for measuring the size and distance of objects, and the magnifying power of the instrument. To measure the size of an object in a single microscope, lay it on a micrometer whose lines are seen magnified in the same proportion with it, and they give, at one view, the real size of the object. For measuring the magnifying power of the compound microscope, the best and readiest method is the following: On the stage, in the focus of the object-glass, lay a micrometer, consisting of an inch divided into one hundred equal parts, count how many divisions of the micrometer are taken into the field of view; then lay a two-foot rule parallel to the micrometer; fix one eye on the edge of the field of light, and the other eye on the end of the rule, which move till the edge of the field of light and the end of the rule correspond; then the distance from the end of the rule to the middle of the stage will be half the diameter of the field. *Ex. gr.* If the distance be ten inches the whole diameter will be twenty, and the number of the divisions of the micrometer contained in the diameter of the field is the magnifying power of the microscope.

Mr. Adams has applied a micrometer that instantly shews the magnifying power of any telescope.

In the Philosophical Transactions for 1791, a very simple micrometer for measuring small angles with the telescope is described by Mr. Cavallo, who introduces his description with the following observations upon the different sorts of telescopical micrometers in use: "These instruments may be divided into two classes; namely, those which have not, and those which have, some movement amongst their parts. The micrometers of the former sort consist mostly of fine wires or hairs, variously disposed, and situated within the telescope, just where the image of the object is formed. In order to determine an angle with those micrometers, a good deal of calculation is generally required. The micrometers of the other sort of which there is a great variety, some being made with moveable parallel wires, others with prisms, others again with a combination of lenses, and so on, are more or less subject to several inconveniences, the principal of which are the following: 1. Their motions generally depend upon the action of a screw; and of course the imperfections of its threads, and the greater or less quantity of lost motion, which is observable in moving a screw, especially when small, occasion a considerable error in the mensuration of angles. 2. Their complication and bulk render them difficultly applicable to a variety of telescopes, especially to the pocket ones. 3. They do not measure the angle without some loss of time, which is necessary to turn the screw, or to move some other mechanism. 4. and lastly, They are considerably expensive, so that some of them cost even more than a tolerably good telescope."

After having had long in view (our author informs us) the construction of a micrometer which might be in part at least, if not entirely, free from all those objections; he, after various attempts, at last succeeded with a simple contrivance, which, after repeated trials, has been found to answer the desired end, not only from his own experience, but from that also of several friends to whom it has been communicated.

This micrometer, in short, consists of a thin and narrow slip of mother-of-pearl finely divided, and situated in the focus of the eye-glass of a telescope, just where the image of the object is formed. It is immaterial whether the telescope be a refractor or a reflector, provided the eye-glass be a convex lens, and not a concave one, as in the Galilean construction.

The simplest way of fixing it is to stick it upon the diaphragm, which generally stands within the tube and in the focus of the eye-glass. When thus fixed, if you look through the eye-glass, the divisions of the micrometrical scale will appear very distinct, unless the diaphragm is not exactly in the focus; in which case, the micrometrical scale must be placed exactly in the focus of the eye-glass, either by pushing the diaphragm backwards or forwards, when that is practicable; or else the scale may be easily removed from one or the other surface of the diaphragm by the interposition of a circular piece of paper or card, or by a bit of wax. This construction is fully sufficient, when the telescope is always to be used by the same person; but when different persons are to use it, then the diaphragm which supports the micrometer must be constructed so as to be easily moved backwards or forwards, though that motion needs not be greater than about a tenth or an eighth of an inch. This is necessary, because the distance of the focus of the same lens appears different to the eyes of different persons; and, therefore, whoever is going to use the telescope for the mensuration of any angle, must first of all unscrew the tube which contains the eye-glass and micrometer from the rest of the telescope, and, looking through the eye-glass, must place the micrometer where the divisions of it may appear quite distinct to his eye.

In case any person should not like to see always the micrometer in the field of the telescope, then the micrometrical scale, instead of being fixed to the diaphragm, may be fitted to a circular perforated plate of brass, wood, or even paper, which may be occasionally placed upon the said diaphragm.

Mr. Cavallo has made several experiments to determine the most useful substance for this micrometer.—Glass, which he had successfully applied for a similar purpose to the compound microscope, seemed at first to be the most promising; but it was at last rejected after several trials: for the divisions upon it generally are either too fine to be perceived, or too rough; and though with proper care and attention the divisions may be proportioned to the sight, yet the thickness of the glass itself obstructs in some measure the distinct view of the object. Ivory, horn, and wood, were found useless for the construction of this micrometer, on account of their bending, swelling, and contracting very easily; whereas mother-of-pearl is a very steady substance, the divisions upon it may be marked very easily, and when it is made as thin as common writing-paper it has a very useful degree of transparency.

Fig. 5. exhibits this micrometer scale, but shows it four times larger than the real size of one, which he has adapted to a three-feet achromatic telescope, that magnifies about 84 times. It is something less than the 24th part of an inch broad; its thickness is equal to that of common writing-paper; and the length of it is determined by the aperture of the diaphragm, which limits the field of the telescope. The divisions upon it are the 200ths of an inch, which reach from one edge of the scale to about the middle of it, excepting

every fifth and tenth division, which are longer. The divided edge of it passes through the centre of the field of view, though this is not a necessary precaution in the construction of this micrometer. Two divisions of the above described scale in my telescope are very nearly equal to one minute; and as a quarter of one of those divisions may be very well distinguished by estimation, therefore an angle of one eighth part of a minute, or of $7''\frac{1}{2}$, may be measured with it.

When a telescope magnifies more, the divisions of the micrometer must be more minute; and Mr. Cavallo finds, that when the focus of the eye-glass of the telescope is shorter than half an inch, the micrometer may be divided with the 500th of an inch; by means of which, and the telescope magnifying about 200 times, one may easily and accurately measure an angle smaller than half a second. On the other hand, when the telescope does not magnify above 30 times, the divisions need not be so minute: for instance, in one of Dollond's pocket telescopes, which when drawn out for use is about 14 inches long, a micrometer with the hundredths of an inch is quite sufficient, and one of its divisions is equal to little else than three minutes, so that an angle of a minute may be measured by it.

"In looking through a telescope furnished with such a micrometer (says our author), the field of view appears divided by the micrometer scale, the breadth of which occupies about one-seventh part of the aperture; and as the scale is semitransparent, that part of the object which happens to be behind it may be discerned sufficiently well to ascertain the division, and even the quarter of a division with which the borders coincide. Fig. 9. shows the appearance of the field of my telescope with the micrometer, when directed to the title-page of the Philosophical Transactions, wherein one may observe that the thickness of the letter C is equal to three-fourths of a division, the diameter of the O is equal to three divisions, and so on.

"At first view, one is apt to imagine that it is difficult to count the divisions which may happen to cover or to measure an object; but, upon trial, it will be found that this is readily performed; and even people who have never been used to observe with the telescope, soon learn to measure very quickly and accurately with this micrometer; for, since every fifth and tenth division is longer than the rest, one soon acquires the habit of saying, five, ten, fifteen; and then, adding the other divisions less than five completes the reckoning. Even with a telescope which has no stand, if the object end of it be rested against a steady place, and the other end be held by the hand near the eye of the observer, an object may be measured with accuracy sufficient for several purposes, as for the estimation of small distances, for determining the height of a house, &c.

"After having constructed and adapted this micrometer to the telescope, it is then necessary to ascertain the value of the divisions. It is hardly necessary to mention, in this place, that though those divisions measure the chords of the angles, and not the angles or arches themselves, and the chords are not as the arches, yet it has been shown, by all the trigonometrical writers, that, in small angles, the chords, arches, sines and tangents follow the same proportion so very nearly that the very minute difference may be safely neglected: so that if one division of this micrometer is equal to one minute, we may safely conclude, that two divisions are equal to two minutes, three divisions to three minutes, and so on. There are various methods of ascertaining the value of the divisions of such a micrometer, they being the very same that are used for ascertaining the value of the divisions in other micrometers. Such are, the passage of an equatorial star over a certain number of divisions in a certain time; or the measuring of the diameter of the sun, by computation from the focal distance of the object, and other lenses of the telescope; the last of which however is subject to several inaccuracies: but as they are well known to astronomical persons, and have been described in many books, they need not be further noticed here. However, for the sake of workmen and other persons not conversant in astronomy, I shall describe an easy and accurate method of ascertaining the value of the divisions of the micrometer.

"Mark upon a wall or other place the length of six inches, which may be done by making two dots or lines six inches asunder, or by fixing a six-inch ruler upon a stand, then place the telescope before it, so that the ruler or six-inch length may be at right angles with the direction of the telescope, and just 57 feet $3\frac{1}{2}$ inches distant from the object-glass of the telescope: this done, look through the telescope at the ruler or other extension of six inches, and observe how many divisions of the micrometer are equal to it, and that same number of divisions is equal to half a degree, or thirty minutes; and this is all that needs be done for the required determination; the reason of which is, because an extension of six inches subtends an angle of $30'$ at the distance of 57 feet $3\frac{1}{2}$ inches, as may be easily calculated by the rules of plane trigonometry.

"In one of Dollond's 14-inch pocket telescopes, if the divisions of the micrometer be the hundredths of an inch, $11\frac{1}{2}$ of those divisions will be found equal to $30'$, or 23 to a degree. When this value has been once ascertained, any other angle measured by any other number of divisions is determined by the rule of three. Thus, suppose that the diameter of the sun seen through the same telescope be found equal to 12 divisions, say as $11\frac{1}{2}$ divisions are to 30 minutes, so are 12 divisions to $\left(\frac{12' \times 30'}{11.5}\right)$ 31.3, which is the required diameter of the sun.

"Notwithstanding the facility of this calculation, a scale may be made answering to the divisions of a micrometer, which will shew the angle corresponding to any number of divisions to mere inspection. Thus, for the above-mentioned small telescope, the scale is represented in fig. 10. AB is the line drawn at pleasure; it is then divided into 23 equal parts, and those divisions which represent the divisions of the micrometer that are equal to one degree, are marked on one side of it. The line then is divided again into 60 equal parts, which are marked on the other side of it; and these divisions represent the minutes which correspond to the divisions of the micrometer: thus the figure shews that six divisions of the micrometer are equal to $15\frac{1}{2}$ minutes, $11\frac{1}{4}$ divisions are nearly equal to 29 minutes, &c. What has been said of minutes may be said of seconds also, when the scale is to be applied to a large telescope.

"Thus far this micrometer and its general use have been sufficiently described; and mathematical persons may easily apply it to the various

purposes to which micrometers have been found subservient. But as the simplicity, cheapness, and at the same time the accuracy of this contrivance, may render the use of it much more general than that of any other micrometer; and I may venture to say, that it will be found very useful in the army, and amongst sea-faring people, for the determination of distances, heights, &c.; I shall therefore join some practical rules to render this micrometer useful to persons unacquainted with trigonometry and the use of logarithms.

"Problem I. The angle, not exceeding one degree, which is subtended by an extension of one foot, being given, to find its distance from the place of observation. *N. B.* This extension of one foot, or any other which may be mentioned hereafter, must be perpendicular to the direction of the telescope through which it is observed. The distances are reckoned from the object glass of the telescope; and the answers obtained by the rules of this problem, though not exactly true, are however so little different from the truth, that the difference seldom amounts to more than two or three inches, which may be safely neglected.

"Rule 1. If the angles be expressed in minutes, say, As the given angle is to 60, so is 687.55 to a fourth proportional, which gives the answer in inches.—2. If the angle be expressed in seconds, say, As the given angle is to 3600, so is 687.55 to a fourth proportional, which expresses the answer in inches.—3. If the angle be expressed in minutes and seconds, turn it all into seconds, and proceed as above.

"Example. At what distance is a globe of one foot in diameter when it subtends an angle of two seconds?

$$2 : 3600 : : 687.55 : \frac{3600 \times 687.55}{2} = 1238590$$

inches, or $103132\frac{1}{2}$ feet, which is the answer required.

"This calculation may be shortened; for, since two of the three proportionals are fixed, their product in the first case is 41253, and in the other two cases is 2475180; so that in the first case, viz. when the angle is expressed in minutes, you need only divide 41253 by the given angle; and in the other two cases, viz. when the angle is expressed in seconds, divide 2475180 by the given angle, and the quotient in either case is the answer in inches.

"Problem II. The angle, not exceeding one degree, which is subtended by any known extension, being given, to find its distance from the place of observation.

"Rule. Proceed as if the extension were of one foot by problem I. and call the answer B; then, if the extension in question be expressed in inches, say, As 12 inches are to that extension, so is B to a fourth proportional, which is the answer in inches; but if the extension in motion be expressed in feet, then you need only multiply it by B, and the product is the answer in inches.

"Example. At what distance is a man six feet high, when he appears to subtend an angle of 30″?

"By problem I. if the man were one foot high, the distance would be 82506 inches; but as he is six feet high, therefore multiply 82506 by 6, and the product gives the required distance, which is 495036 inches, or 41253 feet.

"For greater conveniency, especially in travelling, or in such circumstances in which one has not the opportunity of making even the easy calculations required in those problems, I have calculated the following two tables; the first of which shows the distance answering to any angle from one minute to one degree, which is subtended by an extension of one foot; and the second table shows the distance answering to any angle from one minute to one degree, which is subtended by a man, the height of which has been called an extension of six feet; because, at a mean, such is the height of a man when dressed with hat and shoes on. These tables may be transcribed on a card, and may be had always ready with a pocket telescope furnished with a micrometer. Their use is evidently to ascertain distances without any calculation; and they are calculated only to minutes, because with a pocket telescope and micrometer it is not possible to measure an angle more accurately than to a minute.

"Thus, if one wants to measure the extension of a street, let a foot ruler be placed at the end of the street; measure the angular appearance of it, which suppose to be 36 minutes, and in the table you will have the required distance against 36 minutes, which is $95\frac{1}{2}$ feet. Thus also a man who appears to be 49 minutes high, is at the distance of 421 feet.

*Angles subtended by an extension of one foot at different distances.*

| Angles. | Distances in feet. | Angles. | Distances in feet. |
|---|---|---|---|
| Min. 1 | 3437,7 | Min. 31 | 110,9 |
| 2 | 1718,9 | 32 | 107,4 |
| 3 | 1145,9 | 33 | 104,2 |
| 4 | 859,4 | 34 | 101,1 |
| 5 | 687,5 | 35 | 98,2 |
| 6 | 572,9 | 36 | 95,5 |
| 7 | 491,1 | 37 | 92,9 |
| 8 | 429,7 | 38 | 90,4 |
| 9 | 382,0 | 39 | 88,1 |
| 10 | 343,7 | 40 | 85,9 |
| 11 | 312,5 | 41 | 83,8 |
| 12 | 286,5 | 42 | 81,8 |
| 13 | 264,4 | 43 | 79,9 |
| 14 | 245,5 | 44 | 78,1 |
| 15 | 229,2 | 45 | 76,4 |
| 16 | 214,8 | 46 | 74,7 |
| 17 | 202,2 | 47 | 73,1 |
| 18 | 191,0 | 48 | 71,6 |
| 19 | 180,9 | 49 | 70,1 |
| 20 | 171,8 | 50 | 68,7 |
| 21 | 162,7 | 51 | 67,4 |
| 22 | 156,2 | 52 | 66,1 |
| 23 | 149,4 | 53 | 64,8 |
| 24 | 143,2 | 54 | 63,6 |
| 25 | 137,5 | 55 | 62,5 |
| 26 | 132,2 | 56 | 61,4 |
| 27 | 127,3 | 57 | 60,3 |
| 28 | 122,7 | 58 | 59,2 |
| 29 | 118,5 | 59 | 58,2 |
| 30 | 114,6 | 60 | 57,3 |

*Angles subtended by an extension of six feet at different distances.*

| Angles. | Distances in feet. | Angles. | Distances in feet. |
|---|---|---|---|
| Min. 1 | 20626,8 | Min. 31 | 665,4 |
| 2 | 10313. | 32 | 644,5 |
| 3 | 6875,4 | 33 | 625. |
| 4 | 5156,5 | 34 | 606,6 |
| 5 | 4125,2 | 35 | 589,3 |
| 6 | 3437,7 | 36 | 572,9 |
| 7 | 2946,6 | 37 | 557,5 |
| 8 | 2578,2 | 38 | 542,8 |
| 9 | 2291,8 | 39 | 528,9 |
| 10 | 2062,6 | 40 | 515,6 |
| 11 | 1875,2 | 41 | 503,1 |
| 12 | 1718,8 | 42 | 491,1 |
| 13 | 1586,7 | 43 | 479,7 |
| 14 | 1473,3 | 44 | 468,8 |
| 15 | 1375. | 45 | 458,4 |
| 16 | 1298,1 | 46 | 448,4 |
| 17 | 1213,3 | 47 | 438,9 |
| 18 | 1145,9 | 48 | 429,7 |
| 19 | 1085,6 | 49 | 421. |
| 20 | 1031,4 | 50 | 412,5 |
| 21 | 982,2 | 51 | 404,4 |
| 22 | 937,6 | 52 | 396,7 |
| 23 | 896,8 | 53 | 389,2 |
| 24 | 859,4 | 54 | 381,9 |
| 25 | 825. | 55 | 375. |
| 26 | 793,3 | 56 | 368,3 |
| 27 | 763,9 | 57 | 361,9 |
| 28 | 736,6 | 58 | 355,6 |
| 29 | 711,3 | 59 | 349,6 |
| 30 | 687,5 | 60 | 343,7 |

Mr. Cavallo's micrometer cannot be used in reflecting telescopes, nor in any achromatic telescopes where the adjustment of the eye-piece is effected by rack-work, unless the structure of these instruments is altered for the purpose. And again as the micrometer passes through the centre of the field, the view is rendered unpleasant by the field being divided in two unequal segments; to which may be added, that the different divisions of the micrometer are at unequal distances from the eye-glass, they neither appear equally distinct, nor subtend equal angles at the eye.

To obviate these inconveniences, a mother-of-pearl ring was used by Dr. Brewster, having its interior circumference divided into 360 equal parts. This ring was fixed at the end of a brass tube made to move between the third eye-glass and the diaphragm, so that the divided circumference may be placed exactly in the focus of the glass next the eye. The angle subtended by the diameter of the micrometer may be determined by measuring a base, or by the passage of an equatorial star; from whence the angles subtended by any number of divisions or degrees may be calculated.

The manner of calculating the values of these angles, and a table of the constant part of the formula is given by Dr. B. in No. 113 of the Philosophical Magazine.

By this method of measuring, there is no occasion for turning the micrometer round its axis, because the divided circumference lies in every possible direction. And as the angle to be measured increases, the accuracy of the scale also increases; for when the arch is only 1 or 2 degrees, a variation of one degree produces a variation of about 16 seconds in the angle; but when the arch is between 170 and 180 degrees, the variation of a degree does not change much more than a second in the angle.

In Dr. B.'s own micrometer, the diameter of the field of view is exactly half an inch; the brass tube in which it is fixed is one inch in diameter, and half an inch long, and the degrees of the divided circumference 230th of an inch each.

MICROCOS. In botany, a genus of the class polyandria, order monogynia. Calyx five-leaved; petals five; nectaryless; drupe with a three-celled nut. One species: an East-Indian plant, with terminal, bracted panicle.

MICROPUS. Bastard cudweed. In botany, a genus of the class syngenesia, order polygamia necessaria. Receptacle chaffy; downless; calyx invested with scales; rayless; florets of the margin inclosed in the scales of the calyx. Two species, natives of the south of Europe; one of which, M. supinus, is often cultivated in our own gardens on account of the beauty of its silvery leaves. It is easily propagated by seeds sown in autumn, and requires only common attention and cleanliness.

MICROSCOPE. *s.* [μικρὸς and σκοπέω.] an optical instrument composed of lenses or mirrors, by means of which small objects are made to appear larger than they do to the naked eye.

Microscopes are distinguished into simple and compound, or single and double.

*Simple*, or *Single Microscopes*, are such as consist of a single lens, or a single spherule. And a

*Compound Microscope* consists of several lenses duly combined. As optics have been improved, other varieties have been contrived in this instrument: hence reflecting microscopes, water microscopes, &c.

It is not certainly known when, or by whom, microscopes were first invented; although it is probable they would soon follow upon the use of telescopes, since a microscope is like a telescope inverted. We are informed by Huygens, that one Drebell, a Dutchman, had the first microscope, in the year 1621, and that he was reputed the inventor of it, though F. Fontana, a Neapolitan, in 1646, claims the invention to himself, and dates it from the year 1618. Be this as it may, it seems they were first used in Germany about 1621. According to Borelli, they were invented by Zacharius Jansen and his son, who presented the first microscopes they had constructed to prince Maurice, and Albert arch-duke of Austria. William Borelli, who gives this account in a letter to his brother Peter, says, that when he was ambassador in England in 1619, Cornelius Drebell shewed him a microscope, which he said was the same that the arch-duke had given him, and had been made by Jansen himself. Borelli De vero Telescopii inventore, pa. 35. See LENS, and DIOPTRICS.

I. *Of Single Microscopes.*—The microscopes made use of by Mr. Leewenhoeck were all, as Mr. Baker assures us, of the single kind, and the construction of them was the most simple possible; each consisting only of a single lens set between two plates of silver perforated with a small hole, with a moveable pin before it to place the object on and adjust it to the eye of the beholder. He informs us also, that the lenses only, and not


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globules, were used in every one of these microscopes.

1. The single microscope now most generally known and used is that called Wilson's pocket microscope. See plate 108. fig. 1. The body is made of brass, ivory, or silver, and is represented by AA, BB. CC is a long fine-threaded male screw that turns into the body of the microscope; D a convex glass at the end of the screw. Two concave round pieces of thin brass, with holes of different diameters in the middle of them, are placed to cover the above-mentioned glass, and thereby diminish the aperture when the greatest magnifiers are employed. EE, three thin plates of brass within the body of the microscope; one of which is bent semicircularly in the middle, so as to form an arched cavity for the reception of a tube of glass, the use of the other two being to receive and hold the sliders between them. F, a piece of wood or ivory, arched in the manner of the semicircular plate, and cemented to it. G, the other end of the body of the microscope, where a hollow female screw is adapted to receive the different magnifiers. H, is a spiral spring of steel, between the end G and the plates of brass, intended to keep the plates in a right position and counteract the long screw CC. I is a small turned handle, for the better holding of the instrument, to screw on or off at pleasure.

To this microscope belong six or seven magnifying glasses: six of them are set in silver, brass, or ivory, as in the figure K; and marked 1, 2, 3, 4, 5, 6, the lowest numbers being the greatest magnifiers. L is the seventh magnifier, set in the manner of a little barrel, to be held in the hand for the viewing of any larger object. M is a flat slip of ivory, called a slider, with four round holes through it, wherein to place objects between two pieces of glass or Muscovy talc, as they appear at *d d d d*. Six such sliders, and one of brass, are usually sold with this microscope, some with objects placed in them, and others empty for viewing any thing that may offer: but whoever pleases to make a collection, may have as many as he desires. The brass slider is to confine any small object, that it may be viewed without crushing or destroying it. N, is a tube of glass contrived to confine living objects, such as frogs, fishes, &c. in order to discover the circulation of the blood. All these are contained in a little neat box of fish-skin or mahogany, very convenient for carrying in the pocket.

When an object is to be viewed, thrust the ivory slider in which the said object is placed between the two flat brass plates EE, observing always to put that side of the slider where the brass rings are farthest from the eye. Then screw on the magnifying glass you intend to use, at the end of the instrument G; and looking through it against the light, turn the long screw CC, till your object be brought to suit your eye; which will be known by its appearing perfectly distinct and clear. It is most proper to look at it first through a magnifier that can shew the whole at once, and afterwards to inspect the several parts more particularly with one of the greatest magnifiers; for thus you will gain a true idea of the whole, and of all its parts. And though the greatest magnifiers can shew but a minute portion of any object at once, such as the claw of a flea, the horn of a louse, or the like; yet by gently moving the slider which contains the object, the eye will gradually examine it all over.

As objects must be brought very near the glasses when the greatest magnifiers are made use of, be careful not to scratch them by rubbing the slider against them as you move it in or out. A few turns of the screw CC will easily prevent this mischief, by giving them room enough. You may change the object in your sliders for any others you think proper, by taking out the brass rings with the point of a penknife; the talcs will then fall out, if you but turn the sliders; and after putting what you please between them, by replacing the brass rings you will fasten them as they were before. It is proper to have some sliders furnished with talcs, but without any object between them, to be always in readiness for the examination of fluids, salts, sands, powders, the farina of flowers, or any other casual objects of such sort as need only be applied to the outside of the talc.

The circulation of the blood may be easiest seen in the tails or fins of fishes, in the fine membranes between a frog's toes, or best of all in the tail of a water-newt. If your object be a small fish, place it within the tube N, and spread its tail or fin along the side thereof: if a frog, choose such a one as can but just be got into your tube; and, with a pen, or small stick, expand the transparent membrane between the toes of the frog's hind foot as much as you can. When your object is so adjusted that no part of it can intercept the light from the place you intend to view, unscrew the long screw CC, and thrust your tube into the arched cavity, quite through the body of the microscope; then screw it to the true focal distance, and you will see the blood passing along its vessels with a rapid motion, and in a most surprising manner.

The third or fourth magnifiers may be used for frogs or fishes: but for the tails of water-newts, the fifth or sixth will do; because the globules of their blood are twice as large as those of frogs or fish. The first or second magnifier cannot well be employed for this purpose; because the thickness of the tube in which the object lies will scarce admit its being brought so near as the focal distance of the magnifier.

An apparatus for the purpose of viewing opaque objects generally accompanies this microscope; and which consists of the following parts: A brass arm 2R which is screwed at 2, upon the body of the microscope at G. Into the round hole R, any of the magnifiers suitable to the object to be viewed are to be screwed; and under it, in the same ring, the concave polished silver speculum S. Through a small aperture in the body of the microscope under the brass plates EE, is to slide the long wire with the forceps T; this wire is pointed at one of its ends; and so, that either the points or forceps may be used for the objects as may be necessary. It is easy to conceive, therefore, that the arm at R, which turns by a twofold joint at *a* and *b*, may be brought with its magnifier over the object, the light reflected upon it by the application of the speculum, and the true focus obtained by turning the male screw CC as before directed. As objects are sometimes not well fixed for view, either by the forceps or point, the small piece shewn at N is added, and in such cases answers better: it screws over the point of T; it contains a small round piece of ivory, blackened on one side, and left white upon the other as a contrast to coloured objects, and by a small piece of watch-spring fastens down the objects upon the ivory.

2. *Single Microscope by Reflection.* In fig. 2. A is

a scroll of brass fixed upright upon a round wooden base B, or mahogany drawer or case, so as to stand perfectly firm and steady. C is a brass screw, that passes through a hole in the upper limb of the scroll into the side of the microscope D, and screws it fast to the said scroll. E is a concave speculum set in a box of brass, which hangs in the arch G by two small screws *f f*, that screw into the opposite sides thereof. At the bottom of this arch is a pin of the same metal, exactly fitted to a hole *b* in the wooden pedestal, made for the reception of the pin. As the arch turns on this pin, and the speculum turns on the end of the arch, it may, by this twofold motion, be easily adjusted in such a manner as to reflect the height of the sun, of the sky, or of a candle, directly upwards through the microscope that is fixed perpendicularly over it; and by so doing may be made to answer many purposes of the large double reflecting microcope. The body of the microscope may also be fixed horizontally, and objects viewed in that position by any light you choose, which is an advantage the common double reflecting microscope has not. It may also be rendered further useful by means of a slip of glass; one end of which being thrust through between the plates where the sliders go, and the other extending to some distance, such objects may be placed thereon as cannot be applied in the sliders: and then, having a limb of brass that may fasten to the body of the microscope, and extend over the projecting glass a hollow ring wherein to screw the magnifiers, all sorts of subjects may be examined with great convenience, if a hole be made in the pedestal, to place the speculum exactly underneath, and thereby throw up the rays of light. "The pocket-microscope, thus mounted (says Mr. Baker), is as easy and pleasant in its use, as fit for the most curious examination of the animalcules and salts in fluids, of the farinæ in vegetables, and of the circulation in small animals; in short, is as likely to make considerable discoveries in objects that have some degree of transparency, as any microscope I have ever seen or heard of."

The brass scroll A is now generally made to unscrew into three parts, and pack with the microscope and apparatus into the drawer of a mahogany pocket-case, upon the lid of which the scroll is made to fix when in use.

The opaque apparatus also, as above described, is applicable this way by reflection. It only consists in turning the arm R (fig. 1.), with the magnifier over the concave speculum below (fig. 2.), or to receive the light as reflected obliquely from it: the silver speculum screwed into R will then reflect the light, which it receives from the glass speculum strongly upon the object that is applied upon the wire T underneath.

This microscope, however, is not upon the most convenient construction, in comparison with others now made: it has been esteemed for many years past from its popular name and recommendation by its makers. Its portability is certainly a great advantage in its favour; but in most respects it is superseded by the microscopes hereafter described.

3. *Microscope for Opaque Objects, called the Single Opaque Microscope.*—This microscope remedies the inconvenience of having the dark side of an object next the eye, which formerly was an insurmountable objection to the making observations on opaque objects with any considerable degree of exactness or satisfaction: for, in all other contrivances commonly known, the nearness of the instrument to the object (when glasses that magnify much are used) unavoidably overshadows it so much, that its appearance is rendered obscure and indistinct. And, notwithstanding ways have been tried to point light upon an object, from the sun or a candle, by a convex glass placed on the side thereof, the rays from either can be thrown upon it in such an acute angle only, that they serve to give a confused glare, but are insufficient to afford a clear and perfect view of the object. But by this microscope, by means of a concave speculum of silver highly polished, in whose centre a magnifying lens is placed, such a strong and direct light is reflected upon the object, that it may be examined with all imaginable ease and pleasure. The several parts of this instrument, made either of brass or silver, are as follow:

Through the first side A, passes a fine screw, B, the other end of which is fastened to the moveable side C. D is a nut applied to this screw, by the turning of which the two sides A and C are gradually brought together. E is a spring of steel that separates the two sides when the nut is unscrewed. F is a piece of brass, turning round in a socket, whence proceeds a small spring tube moving upon a rivet; through which tube there runs a steel wire, one end whereof terminates in a sharp point G, and the other with a pair of pliers H fastened to it. The point and pliers are to thrust into, or take up and hold, any insect or object; and either of them may be turned upwards, as best suits the purpose. I is a ring of brass, with a female screw within it, mounted on an upright piece of the same metal; which turns round on a rivet, that it may be set at a due distance when the least magnifiers are employed. This ring receives the screws of all the magnifiers. K is a concave speculum of silver, polished as bright as possible; in the centre of which is placed a double convex lens, with a proper aperture to look through it. On the back of this speculum a male screw L is made to fit the brass ring I, to screw into it at pleasure. There are four of these concave specula of different depths, adapted to four glasses of different magnifying powers, to be used as the objects to be examined may require. The greatest magnifiers have the least apertures. M is a round object-plate, one side of which is white and the other black: the intention of this is to render objects the more visible, by placing them, if black, on the white side, or, if white, on the black side. A steel spring N turns down on each side to make any object fast; and issuing from the object-plate is a hollow pipe to screw it on the needle's point G. O is a small box of brass, with a glass on each side, contrived to confine any living object in order to examine it: this also has a pipe to screw upon the end of the needle G. P is a turned handle of wood, to screw into the instrument when it is made use of. Q, a pair of brass pliers to take up any object, or manage it with conveniency. R is a soft hair brush for cleaning the glasses, &c. S is a small ivory box for talcs, to be placed, when wanted, in the small brass box O.

When you would view any object with this microscope, screw the speculum, with the magnifier you think proper to use, into the brass ring I. Place your object, either on the needle G in the pliers H, on the object-plate M, or in the hollow brass box O, as may be most convenient: then, holding up your instrument by the handle P, look against the light through the magnifying lens; and by means of the nut D, together with the mo-

tion of the needle, by managing its lower end, the object may be turned about, raised, or depressed, brought nearer the glass, or removed farther from it, till you find the true focal distance, and the light be seen strongly reflected from the speculum upon the object, by which means it will be shewn in a manner surprisingly distinct and clear; and for this purpose the light of the sky or of a candle will answer very well. Transparent objects may also be viewed by this microscope; only observing, that when such come under examination, it will not always be proper to throw on them the light reflected from the speculum; for the light transmitted through them, meeting the reflected light, may together produce too great a glare. A little practice, however, will shew how to regulate both lights in a proper manner.

4. *Ellis's Single and Aquatic Microscope.* Fig. 4. represents a very convenient and useful microscope contrived by Mr. John Ellis, author of an Essay upon Corallines, &c. To practical botanists, observers of animalcula, &c. it possesses many advantages above those just described. It is portable, simple in its construction, expeditious, and commodious in use. K represents the box containing the whole apparatus: it is generally made of fish-skin; and on the top there is a female screw, for receiving the screw that is at the bottom of the pillar A: this is a pillar of brass, and is screwed on the top of the box. D is a brass pin which fits into the pillar; on the top of this pin is a hollow socket to receive the arm which carries the magnifiers; the pin is to be moved up and down, in order to adjust the lenses to their focal or proper distance from the object.—(N.B. In the representations of this microscope, the pin D is delineated as passing through a socket at one side of the pillar A; whereas it is usual at present to make it pass down a hole bored through the middle of the pillar.) E, the bar which carries the magnifying lens; it fits into the socket X, which is at the top of the pin or pillar D. This arm may be moved backwards and forwards in the socket X, and sideways by the pin D; so that the magnifier, which is screwed into the ring at the end E of this bar, may be easily made to traverse over any part of the object that lies on the stage or plate B. FF is a polished silver speculum, with a magnifying lens placed at the centre thereof, which is perforated for this purpose. The silver speculum screws into the arm E, as at F. G, another speculum, with its lens, which is of a different magnifying power from the former. H, the semicircle which supports the mirror I; the pin R, affixed to the semicircle H, passes through the hole which is towards the bottom of the pillar A. B, the stage, or the plane, on which the objects are to be placed; it fits into the small dove-tailed arm which is at the upper end of the pillar DA. C, a plane glass, with a small piece of black silk stuck on it; this glass is to lay in a groove made on the stage B. M, a hollow glass to be laid occasionally on the stage instead of the plane glass C. L, a pair of nippers. These are fixed to the stage by the pin at the bottom; the steel wire of these nippers slides backwards and forwards in the socket, and this socket is moveable upwards and downwards by means of the joint, so that the position of the object may be varied at pleasure. The object may be fixed in the nippers, stuck on the point, or affixed, by a little gum-water, &c. to the ivory cylinder N, which occasionally screws to the point of the nippers.

To *use* this microscope: Take all the parts of the apparatus out of the box; then begin by screwing the pillar A to the cover thereof; pass the pin R of the semicircle which carries the mirror through the hole that is near the bottom of the pillar A; push the stage into the dove-tail at B, slide the pin into the pillar (see the N. B. above); then pass the bar E through the socket which is at the top of the pin D, and screw one of the magnifying lenses into the ring at F. The microscope is now ready for use: and though the enumeration of the articles may lead the reader to imagine the instrument to be of a complex nature, we can safely affirm that he will find it otherwise. The instrument has this peculiar advantage, that it is difficult to put any of the pieces in a place which is appropriated to another. Let the object be now placed either on the stage or in the nippers L, and in such manner that it may be as nearly as possible over the centre of the stage: bring the speculum F over the part you mean to observe; then throw as much light on the speculum as you can, by means of the mirror I, and the double motion of which it is capable; the light received on the speculum is reflected by it on the object. The distance of the lens F from the object is regulated by moving the pin D up and down, until a distinct view of it is obtained. The best rule is, to place the lens beyond its focal distance from the object, and then gradually to slide it down till the object appears sharp and well defined. The adjustment of the lenses to their focus, and the distribution of the light on the object, are what require the most attention: on the first the distinctness of the vision depends; the pleasure arising from a clear view of the parts under observation is due to the modification of the light. No precise rule can be given for attaining accurately these points; it is from practice alone that ready habits of obtaining these necessary properties can be acquired, and with the assistance of this no difficulty can be found.

5. A very simple and convenient microscope for botanical and other purposes, though inferior in many respects to that of Mr. Ellis, was contrived by the late ingenious Mr. Benjamin Martin, and is represented at fig. 5. where AB represents a small arm supporting two or more magnifiers, one fixed to the upper part as at B, the other to the lower part of the arm at C; these may be used separately, or combined together. The arm AB is supported by the square pillar IK, the lower end of which fits into the socket E of the foot FG; the stage DL is made to slide up and down the square pillar; H, a concave mirror for reflecting light on the object.—To *use* this microscope, place the object on the stage, reflect the light on it from the concave mirror, and regulate it to the focus, by moving the stage near to or farther from the lens at B. The ivory sliders pass through the stage; other objects may be fixed in the nippers MN, and then brought under the eye-glasses; or they may be laid on one of the glasses which fit the stage. The apparatus to this instrument consists of three ivory sliders; a pair of nippers; a pair of forceps; a flat glass and a concave ditto, both fitted to the stage.

The two last microscopes are frequently fitted up with a toothed rack and pinion, for the more ready adjustment of the glasses to their proper focus.

6. *Withering's Portable Botanic Microscope.*—Fig. 6. represents a small botanical microscope contrived by Dr. Withering, and described by him in his Botanical Arrangements. It consists of three brass

plates, A, B, C, which are parallel to each other; the wires D and E are riveted into the upper and lower plates, which are by this means united to each other; the middle plate or stage is moveable on the aforesaid wires by two little sockets which are fixed to it. The two upper plates each contain a magnifying lens, but of different powers; one of these confines and keeps in their places the fine point F, the forceps G, and the small knife H.—To *use* this instrument, unscrew the upper lens, and take out the point, the knife, and the forceps; then screw the lens on again, place the object on the stage, and then move it up or down till you have gained a distinct view of the object, as one lens is made of a shorter focus than the other; and spare lenses of a still deeper focus may be had if required. This little microscope is the most portable of any. Its principal merit is its simplicity.

7. *Botanical Lenses or Magnifiers.*—The haste with which botanists, &c. have frequently occasion to view objects, renders an extempore pocket-glass indispensably necessary. The most convenient of any yet constructed appears to be that contrived, in regard to the form of the mounting, by the late Mr. Benjamin Martin; and is what he called a hand megalascope, because it is well adapted for viewing all the larger sort of small objects universally, and by only three lenses it has seven different magnifying powers.

Fig. 7. represents the case with the three frames and lenses, which are usually of 1, 1½, and 2 inches focus: they all turn over each other, and shut into the case, and are turned out at pleasure.

The three lenses singly afford three magnifying powers; and by combining two and two, we make three more: for *d* with *e* makes one, *d* with *f* another, and *e* with *f* a third; which, with the three singly, make six; and lastly, all three combined together make another; so that, upon the whole, there are seven powers of magnifying with these glasses only.

When the three lenses are combined, it is better to turn them in, and look through them by the small apertures in the sides of the case. The eye in this case is excluded from extra light; the aberration of the superfluous rays through the glasses is cut off; and the eye coincides more exactly with the common axes of the lenses.

A very useful and easy kind of microscope (described by Joblot, and which has been long in use), adapted chiefly for viewing, and confining at the same time, any living insects, small animals, &c. is shewn at fig. 8. where A represents a glass tube, about 1½ inches diameter, and 2 inches high. B, a case of brass or wood, containing a sliding tube, with two or three magnifying glasses that may be used either separately or combined. In the inside, at the bottom, is a piece of ivory, black and white on opposite sides, that is occasionally removed, and admits a point to be screwed into the centre. The cap unscrews at D, to admit the placing of the object: the proper distance of the glasses from the object is regulated by pulling up or down the brass tube E at top containing the eye-glasses.

This microscope is particularly useful for exhibiting the well-known curious curculio imperialis, vulgarly called the diamond beetle, to the greatest advantage; for which, as well as for other objects, a glass bottom and a polished reflector at the top are often applied, to condense the light upon the object. In this case, the stand and brass bottom F, as shewn in the same figure, are taken away by unscrewing.

9. *Mr. Lyonet's Single Anatomical Dissecting Microscope.*—Fig. 9. represents a curious and extremely useful microscope, invented by that gentleman for the purpose of minute dissections and microscopic preparations. This instrument must be truly useful to amateurs for the minutiæ of insects, &c. being the best adapted of any for the purposes of dissection. With this instrument Mr. Lyonet made his very curious microscopical dissection of the *chenille de saule*, as related in his Traité Anatomique de la chenille qui ronge le bois de saule, 4to.

AB is the anatomical table, which is supported by a pillar NO; this is screwed on the foot CD. The table AB is prevented from turning round by means of two steady pins. In this table or board there is a hole G, which is exactly over the centre of the mirror EF, that is to reflect the light on the object; the hole G is designed to receive a flat or concave glass, on which the objects for examination are to be placed.

RXZ is an arm formed of several balls and sockets, by which means it may be moved in every possible situation; it is fixed to the board by means of the screw H. The last arm IZ has a female screw, into which a magnifier may be screwed as at Z. By means of the screw H, a small motion may be occasionally given to the arm IZ, for adjusting the lens with accuracy to its focal distance from the object.

Another chain of balls is sometimes used, carrying a lens to throw light upon the object; the mirror is likewise so mounted, as to be taken from its place at K, and fitted on a clamp, by which it may be fixed to any part of the table AB.

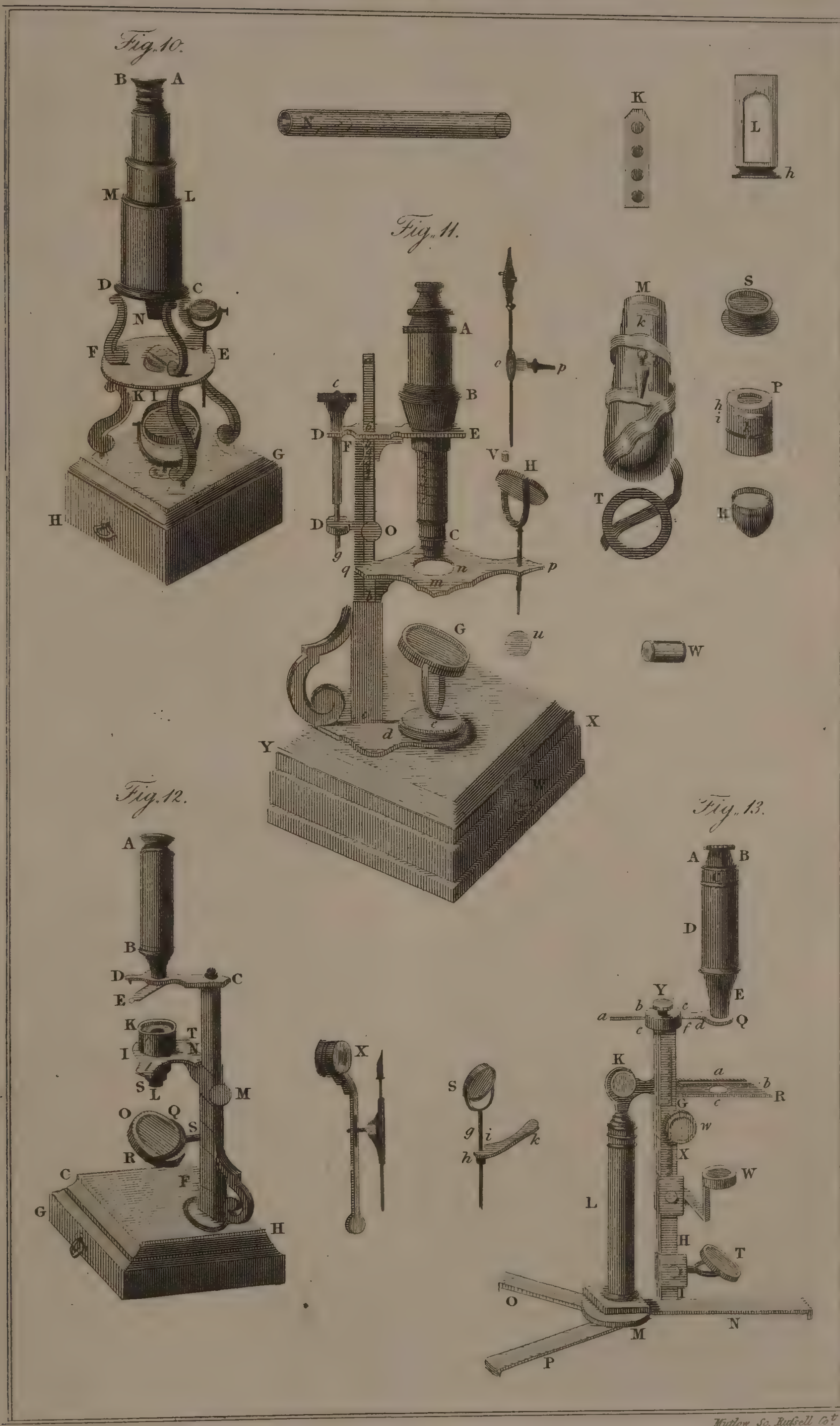
*To use the dissecting table.*—Let the operator sit with his left side near a light window; the instrument being placed on a firm table, the side DH towards the stomach, the observations should be made with the left eye. In dissecting, the two elbows are to be supported by the table on which the instrument rests, the hands resting against the board AB; and in order to give it greater stability (as a small shake, though imperceptible to the naked eye, is very visible in the microscope), the dissecting instruments are to be held one in each hand, between the thumb and two forefingers.

### II. *Of Double Microscopes, commonly called Compound Microscopes.*

Double microscopes are so called, from being a combination of two or more lenses.

The particular and chief advantages which the compound microscopes have over the single are, that the objects are represented under a larger field of view, and with a greater amplification of reflected light.

1. *Culpeper's Microscope.*—The compound microscope, originally contrived by Mr. Culpeper, is represented at fig. 10. Pl. 109. It consists of a large external brass body A, B, C, D, supported upon three scrolls, which are fixed to the stage EF; the stage is supported by three larger scrolls, that are screwed to the mahogany pedestal GH. There is a drawer in the pedestal, which holds the apparatus. The concave mirror *I* is fitted to a socket in the centre of the pedestal. The lower part LMCD of the body forms an exterior tube, into which the upper part of the body ABLM slides, and may be moved up or down, so as to bring the magnifiers,

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which are screwed on at N, nearer to or farther from the object.

To *use* this microscope:—Screw one of the buttons, which contains a magnifying lens, to the end N of the body; place the slider, with the objects, between the plates of the slider-holder. Then, to attain distinct vision, and a pleasing view of the object, adjust the body to the focus of the lens you are using, by moving the upper part gently up and down, and regulate the light by the concave mirror.

For opaque objects, two additional pieces must be used. The first is a cylindrical tube of brass (represented at L, fig. 11.), which fits on the cylindrical part at N of the body The second piece is the concave speculum *h*; this is to be screwed to the lower end of the aforesaid tube: the upper end of this tube should be made to coincide with the line which has the same number affixed to it as to the magnifier you are using; *ex. gr.* if you are making use of the magnifier marked 5, slide the tube to the circular line on the tube N, that is marked also with No. 5. The slider-holder should be removed when you are going to view opaque objects, and a plane glass should be placed on the stage in its stead to receive the object; or it may be placed in the nippers, the pin of which fits into the hole in the stage.

The apparatus belonging to this microscope consists of the following particulars; viz. Five magnifiers, each fitted in a brass button: one of these is seen at N, fig. 10. Six ivory sliders, five of them with objects. A brass tube to hold the concave speculum. The concave speculum in a brass box. A fish-pan. A set of glass tubes. A flat glass fitted to the stage. A concave glass fitted to the stage. A pair of forceps. A steel wire with a pair of nippers at one end and a point at the other. A small ivory cylinder, to fit on the pointed end of the aforesaid nippers. A convex lens, moveable in a brass semicircle; this is affixed to a long brass pin, which fits into a hole on the stage.

The construction of the foregoing microscope is very simple, and it is easy in use; but the advantages of the stage and mirror are too much confined for an extensive application and management of all kinds of objects. Its greatest recommendation is its cheapness; and to those who are desirous of having a compound microscope at a low price, it may be acceptable.

2. *Cuff's Microscope.*—The improved microscope next in order is that of Mr. Cuff. Besides remedying the disadvantages above mentioned, it contains the addition of an adjusting screw, which is a considerable improvement, and highly necessary to the examination of objects under the best defined appearance from the glasses. It is represented at fig. 11. with the apparatus that usually accompanies it. A, B, C, shews the body of this microscope, which contains an eye-glass at A, a broad lens at B, and a magnifier which is screwed on at C. The body is supported by the arm DE, from which it may be removed at pleasure. The arm DE is fixed on the sliding bar F, and may be raised or depressed to any height within its limits. The main pillar *ab* is fixed in the box *bc*; and by means of the brass foot *d* is screwed to the mahogany pedestal XY, in which is a drawer containing all the apparatus. O is a milled-headed screw, to tighten the bar F when the adjusting screw *cg* is used. *pq* is the stage, or plate, which carries the objects; it has a hole at the centre *n*. G a concave mirror, that may be turned in any direction, to reflect the light of a candle, or the sky, upon the object.

To *use* this microscope:—Screw the magnifier you intend to use to the end C of the body, place the slider-holder P in the hole *n*, and the slider with the object between the plates of the slider-holder; set the upper edge of the bar DE to coincide with the divisions which correspond to the magnifier you have in use, and pinch it by the milled nut; now reflect a proper quantity of light upon the object, by means of the concave mirror G, and regulate the body exactly to the eye and the focus of the glasses by the adjusting screw *cg*.

To view opaque objects, take away the slider-holder P, and place the object on a flat glass under the centre of the body, or on one end of the jointed nippers *op*. Then screw the silver concave speculum *h* to the end of the cylinder L, and slide this cylinder on the lower part of the body, so that the upper edge thereof may coincide with the line which has the same mark with the magnifier that is then used; reflect the light from the concave mirror G to the silver speculum, from which it will again be reflected on the object. The glasses are to be adjusted to their focal distance, as before directed.

The apparatus consists of a convex lens H, to collect the rays of light from the sun or a candle, and condense them on the object. L a cylindrical tube, open at each side, with a concave speculum screwed to the lower end *h*. P the slider-holder: this consists of a cylindrical tube, in which an inner tube is forced upwards by a spiral spring; it is used to receive an ivory slider K, which is to be slid between the plates *h* and *i*. The cylinder P fits the hole *n* in the stage; and the hollow part at *k* is designed to receive a glass tube. R is a brass cone, to be put under the bottom of the cylinder P, to intercept occasionally some of the rays of light. S a box containing a concave and a flat glass, between which a small living insect may be confined: it is to be placed over the hole *n*. T a flat glass, to lay any occasional object upon; there is also a concave one for fluids. O is a long steel wire, with a small pair of pliers at one end, and a point at the other, designed to stick or hold objects; it slips backwards and forwards in the short tube *o*; the pin *p* fits into the hole of the stage. W a little round ivory box, to hold a supply of talc and rings for the sliders. V a small ivory cylinder, that fits on the pointed end of the steel wire: it is designed for opaque objects. Light-coloured ones are to be struck upon the dark side, and *vice versa*. M a fish-pan, whereon to fasten a small fish, to view the circulation of the blood: the tail is to be spread across the oblong hole *k* at the small end, and tied fast by means of a ribband fixed thereto: the knob *l* is to be shoved through the slit made in the stage, that the tail may be brought under the magnifier.

3. This microscope has received several material improvements from Mr. Martin, Mr. Adams, &c. By an alteration, or rather an enlargement, of the body of the tube which contains the eye-glasses, and also of the eye-glasses themselves, the field of view is made much larger, the mirror below for reflecting light is made to move upon the same bar with the stage; by which means the distance of it from the stage may be very easily and suitably varied. A condensing glass is applied under the stage in the slider-holder, in order to modify and increase the light that is reflected by the mirrors

below from the light of a candle or lamp. It is furnished also with two mirrors in one frame, one concave and the other plane, of glass silvered; and by simply unscrewing the body, the instrument, when desired, may be converted into a single microscopé. Fig. 12. is a representation of the instrument thus improved; and the following is the description of it, as given by Mr. Adams in his Essays.

AB represents the body of the microscope, containing a double eye-glass and a body-glass: it is here shown as screwed to the arm CD, from whence it may be occasionally removed, either for the convenience of packing, or when the instrument is to be used as a single microscope.

The eye-glasses and the body-glasses are contained in a tube which fits into the exterior tube AB; by pulling out a little this tube when the microscope is in use, the magnifying power of each lens is increased.

The body AB of the microscope is supported by the arm CD; this arm is fixed to the main pillar CF, which is screwed firmly to the mahogany pedestal GH; there is a drawer to this pedestal, which holds the apparatus.

NIS, The plate or stage which carries the slider-holder KL: this stage is moved up or down the pillar CF, by turning the milled nut M; this nut is fixed to a pinion, that works in a toothed rack cut on one side of the pillar. By means of this pinion, the stage may be gradually raised or depressed, and the object adjusted to the focus of the different lenses.

KL is a slider-holder, which fits into a hole that is in the middle of the stage NIS; it is used to confine and guide either the motion of the sliders which contain the objects, or the glass tubes that are designed to confine small fishes for viewing the circulation of the blood. The sliders are to be passed between the two upper plates, the tubes through the bent plates.

L is a brass tube, to the upper part of which is fixed the condensing lens before spoken of; it fits into the under part of the slider-holder KL, and may be set at different distances from the object, according to its distance from the mirror or the candle.

O is the frame which holds the two reflecting mirrors, one of which is plane, the other concave. These mirrors may be moved in various directions, in order to reflect the light properly, by means of the pivots on which they move, in the semicircle QSR, and the motion of the semicircle itself on the pin S: the concave mirror generally answers best in the daytime; the plane mirror combines better with the condensing lens, and a lamp or candle. At D there is a socket for receiving the pin of the arm Q (fig. 31.), to which the concave speculum, for reflecting light on opaque objects, is fixed. At S is a hole and slit for receiving either the nippers L (fig. 31. pl. 7.) or the fish-pan I; when these are used, the slider-holder must be removed. T, a hole to receive the pin of the convex lens M, fig. 31.

To *use* this microscope:—Take it out of the box. Screw the body into the round end of the upper part of the arm CD. Place the brass sliders, which contain the magnifiers, into the dove-tailed slit which is on the under side of the aforesaid arm, as seen at E, and slide it forwards until the magnifier you mean to use is under the centre of the body. Opposite to each magnifier in this slit there is a notch, and in the dove-tailed part of the arm CD there is a spring, which falls into the above-mentioned notch, and thus makes each magnifier coincide with the centre of the body. Pass the ivory slider you intend to use between the upper plates of the slider-holder KL, and then reflect as strong a light as you can on the object by means of one of the mirrors; after this, adjust the object to the focus of the magnifier and your eye, by turning the milled screw M, the motion of which raises and depresses the stage NIS. The degree of light necessary for each object, and the accuracy required in the adjustment of the lenses to their proper focal distance from the object, will be easily attained by a little practice.

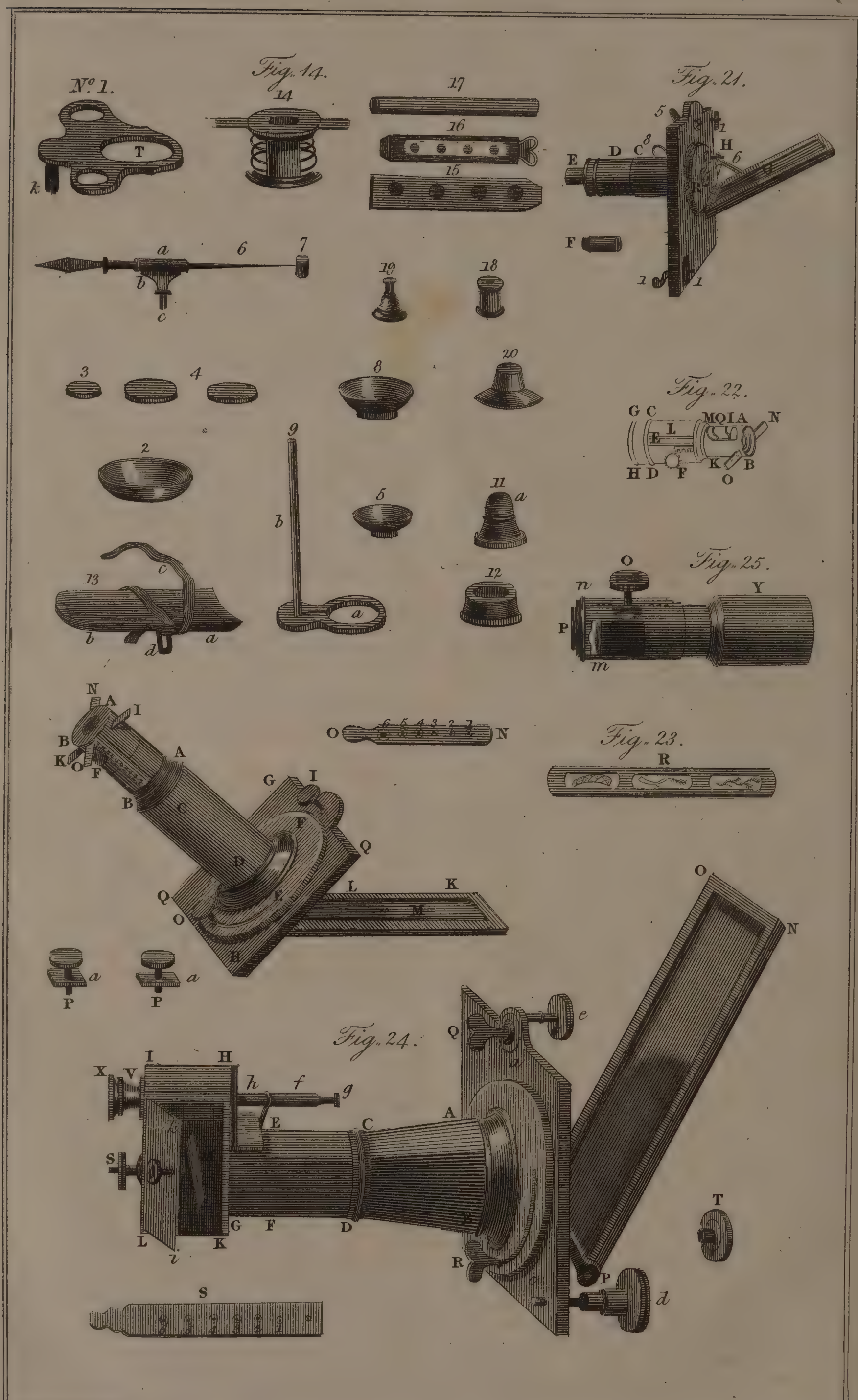
When opaque objects are to be examined, remove the slider-holder, and place the object on a flat glass, or fix it to the nippers L, the pin of these fit into the hole on the stage; screw the concave speculum R into the arm Q (fig. 31), and then pass the pin of this arm through the socket D, fig. 12; the light is now to be reflected from the concave mirror to the silver speculum, and from this down on the object. No exact rule can be given for reflecting the light on the object; we must therefore refer the reader to the mother of all aptness, practice. The speculum must be moved lower or higher, to suit the focus of the different magnifiers and the nature of the object.

The foregoing directions apply equally to the using of this instrument as a single microscope; with this difference only, that the body A B is then removed, and the eye is applied to the upper surface of the arm CD, exactly over the magnifiers.

This microscope is sometimes made with the following alterations, which are supposed to make it still more convenient and useful. The arm CD that carries the body and magnifiers is made both to turn on a pin, and to slide backwards and forwards in a socket at C; so that instead of moving the objects below on the stage, and disturbing them, the magnifiers are more conveniently brought over any part of the objects as desired. The condensing glass is made larger, and slides upon the square bar CF quite distinct from the stage, like the mirrors below; and it is thereby made useful for any other objects that may be applied on glasses fitted to the stage, as well as those put into the slider-holder K. It is thereby not confined to this stage alone, as in the preceding. When the body AB is taken away, the arm CD may be slipt away from its bar, with the magnifiers, and the forceps, wire, and joint, applied to it; and it thereby serves the purpose of a small hand single or opaque microscope, for any object occasionally applied to this wire. The magnifiers in the slider E are mounted in a wheel case, which perhaps prevents its being in the way so much as the long slider E before described.—This contrivance is represented at x, fig. 12.

4. *Martin's New Universal Compound Microscope.*—This instrument was originally constructed by the late Mr. Benjamin Martin, and intended to comprise all the uses and advantages of the single, compound, opaque, and aquatic microscopes. The following is a description of it as now made, with a few alterations, chiefly suggested (we are told) by Mr. Jones of Holborn.

Fig. 13. is a representation of the instrument placed up for use. A, B, C, D, is the body of the microscope: which consists of four parts, viz. AB the eye-piece, or that containing the eye-glasses, and is screwed into C, which is a moveable or sliding tube on the top; this inner tube contains the body-glass screwed into its lower part. D is the

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exterior tube or case, in which the other slides up and down in an easy and steady manner. This motion of the tube C is useful to increase or decrease the magnifying power of the body-glass when thought necessary, as before mentioned. E is a pipe or snout screwed on to the body of the microscope D, and at its lower part, over the several magnifying lenses hereafter described. FGHI is the square stem of the microscope, upon which the stage R moves in an horizontal position, upwards or downwards, by means of the fine rackwork of teeth and pinion. KL is a strong solid joint and pillar, by which the position of the instrument is readily altered from a vertical one to an oblique or to a perfectly horizontal one, as may be required: it is thus well adapted to the ease of the observer either sitting or standing; and as it is very often convenient to view objects by direct unreflected light, when the square stem FI is placed in an horizontal position for this purpose, the mirror T is then to be taken off in order to prevent the obstruction of the rays. M is a circular piece of brass, serving as a base to the pillar. NOP, the tripod or foot by which the whole body of the microscope is steadily supported; it folds up when packed into the case. W is a brass frame, that contains the condensing lens, and acts in conjunction with the large concave and plane mirrors below at T; the reflected rays from which, either of the common light or of that of a candle or lamp, it agreeably modifies, and makes steady in the field of view.

The particulars of the apparatus to this microscope are as follow: Q is a circular brass box, containing six magnifiers or object lenses, numbered 1, 2, 3, 4, 5, 6; the digits of which appear severally through a small round hole in the upper plate of it. To the upper side is fixed a small circle of brass, by which it is connected with, and screwed into, the round end of the arm *abcd*; which is a long piece of brass, and moves through either by teeth or pinion, or not, as may be desired, in *ef*; which is a socket on the upper part of the pillar, and admits, with a motion both easy and steady, the brass arm. R is a fixed stage, upon which the objects to be viewed are to be placed: it is firmly fastened to the square pillar, which is moved by the rackwork. In the middle is a large circular hole, for receiving concave glasses, with fluids, &c. it has also a sliding spring-frame to fasten down slips of glass or other things: at *abc* are three small sockets or holes, intended to receive several parts of the apparatus. S is the refractor, or illuminating lens, for converging the sun's rays upon opaque objects laid upon the stage R. To this purpose it moves on a semicircle upon a long shank *g*, in a spring socket *h*, in the arm *i*; this arm moving every wayby a stout pin *k* in the socket *a* of the stage. In this manner it is easily adjusted to any position of the sun, candle, &c.—T, the reflecting-glass frame, containing a concave and plane speculum, which is moved upon the square pillar by the hand. The use of it is to illuminate all transparent objects that are applied to the stage above.

Fig. 14, plate 110, N° 1, is an auxiliary moveable stage; which by means of a pin *k* is placed in the hole *a* of the stage R, and can be moved in an horizontal direction over the whole field of the stage. In this stage there are three circular holes with shouldered bottoms: a large one in the middle, and on each side a small one, for the reception of the three following necessary articles: N° 2, a watch-glass to be placed in the large hole, to hold fluids containing animalcules, &c.; a circular piece of ivory, N° 3, one side of which is black, the other white, to support opaque objects of different contrasted colours; and circular plane and concave glasses, N° 4, for extemporaneous transparent objects.—The same use is made of the other small hole as of the large one, only in a lesser degree, to receive small concave glasses, plates, &c.

N° 5, is the silvered speculum, called a *liberkuhn*, which makes the single opaque microscope, by being screwed to the slider *abcd* (fig. 13.) instead of the box of lenses Q, and the body AE above it. The chief use of this is to view very small objects strongly illuminated near the compounded focus of the mirror T (fig. 13.) N° 6, is the forceps, or pliers, for holding such kind of objects, and by which they can be applied very readily to the focus of the lens in the liberkuhn. They have a motion all ways by means of the spring socket *a*, the joint *b*, and the shank *c*: they are placed in the socket *c* of the fixed stage R (fig. 13.) N° 7, is a small piece of ivory, to be placed upon the pointed end of the pliers; it is black upon one side, and white upon the other, to receive opaque objects.

N° 8, is a liberkuhn of a larger size than that first mentioned, with a hole in its centre: this is screwed into N° 9, the hole *a* of a brass ring, fastened to a long wire *b*; which moves up and down in the spring socket *b* of the stage R, in which it also moves sideways; and thus, with the body AE above, forms an aquatic compound microscope for showing all sorts of objects in water and other fluids placed under it in the watch-glass N° 2, on the stage.

N° 11, is a cone with a proper aperture *a* to exclude superfluous light, that would disturb a critical observation of a curious object; it is placed on the under side of the fixed stage R.

N° 12, is what is usually called a bug-box, consisting of a concave glass with a plane one screwed over it; by means of which a bug, louse, flea, &c. may be secured and viewed alive. It is to be placed on either of the stages R (fig. 13.), or N° 1, (fig. 14.)

N° 13, is the fish-pan. In the long concave body *ab*, a fish may be so confined by the ribband *c*, that the transparent tail may be in part over the slit or hole at *a*. In this state, it is placed on the stage R, with the pin *d* in the hole *c* of the stage, and moves freely and horizontally for viewing the circulation of the blood, &c.

N° 14, is the slider-holder that is placed on the stage R: it receives the sliders and tubes when filled with transparent objects, to be viewed either by the compound or single microscope.

N° 15, represents the ivory slider, to hold the objects between the talcs as usual.

N° 16, is a useful auxiliary slider framed in brass. In this slider small concave glasses are cemented; and a slip of plane glass slides over them; by which any small living object, as mites, &c. may be confined without injury, and deliberately viewed.

N° 17, represents a set of glass tubes, three in number, one within another; they are useful for small tad-poles, water-newts, eels, &c. when the circulation of the blood is to be viewed. There is a small hole at one end of each tube, that serves to admit the air; for, when they are filled with water, the other end is stopped with a cork.

N° 18, is a small ivory box, containing spare talcs and wires, to supply the sliders with occasionally.

N° 19, a brass cell or button, containing a very small lens, properly set between two small plates of brass, that it may be brought very near to the object when viewed therewith as a single microscope.

This magnifier is screwed into the same hole as the wheel of six magnifiers Q are (fig. 13.)

N° 20, is a lens, adapted to view and examine objects, by magnifying them sufficiently, so as to be able to apply them to the microscope for inspection: on this account it is called the explorator.

The preceding are the chief articles of the apparatus; which, on account of their being somewhat different from what is applied to other microscopes, we have been thus particular in describing. In using the microscope, and while viewing objects by either the single or compound instrument, the focal distances of the magnifiers are made perfectly exact by turning of the pinion at the nut *w*, in one way or the other, very gently in the teeth of the rackwork at X (fig. 13.).

It is necessary that the centres of the object lenses or magnifiers, the stage, and the mirrors at bottom, should all be in a right line in the axis of the microscope, when opaque objects are to be viewed, that are placed upon the ivory piece N° 7, or the forceps N° 6, and all other such sort of objects which are placed in the centre of the stage R, or slider-holder N° 14: but when aquatic or living objects, which require a great space to move in, are to be viewed, then the horizontal motion at *ef* (fig. 13.) is made use of, and the view may be extended laterally over the whole of the diameter of the object or field of view: and by putting the arm *abcd* forward or backward in its socket *ef*, the view is extended in the contrary direction equally well; and in this manner the whole of the objects may be viewed without the least disturbance.

As the brass arm *a b c d* may be brought to the height of three or four inches above the stage R; so, by means of the rack-work motion of the stage, a lens of a greater focal distance than the greatest in the wheel Q may be occasionally applied in place of the wheel, and thereby the larger kind of objects be viewed; the instrument becoming, in this case, what is called a megalascope.

In viewing moving living objects, or even fixed ones, when nice motions are requisite, a rack-work and pinion is often applied to the arm *a b c d*: the arm is cut out with teeth; and the pinion, as shown at Y, is applied to work it. This acts but in one direction; and, in order to produce an equally necessary motion perpendicular to this, rack-work and pinion is applied tangent-wise to the stage, which is then jointed.

What has been related above respects the construction of those denominated parlour microscopes, in contradistinction to those which are portable: their dimensions, however, have been considerably reduced by opticians, in order to render them fit for the pocket; and as they are for the most part constructed on nearly the same principles as those which have been already described, what has been said will sufficiently instruct our readers in using any pocket microscope whatever. Only it may be observed, that in those reduced instruments, both the field of view and the magnifying power are proportionably diminished.

### III. *Of Solar Microscopes.*

This instrument, in its principle, is composed of a tube, a looking-glass or mirror, a convex lens, and Wilson's single microscope before described. See Plate 110. The sun's rays being reflected through the tube by means of the mirror upon the object, the image or picture of the object is thrown distinctly and beautifully upon a screen of white paper or a white linen sheet, placed at a proper distance to receive the same; and may be magnified to a size not to be conceived by those who have not seen it; for, the farther the screen is removed, the larger will the object appear; insomuch that a louse may thus be magnified to the length of five or six feet, or even a great deal more; though it is more distinct when not enlarged to above half that size.

The different forms in which the solar microscope is constructed are as follow:

1. The old construction is represented in fig. 21, Plate 110. A is a square wooden frame, through which pass two long screws assisted by a couple of nuts 1, 1. By these it is fastened firmly to a window-shutter, wherein a hole is made for its reception; the two nuts being let into the shutter, and made fast thereto. A circular hole is made in the middle of this frame to receive the piece of wood B, of a circular figure; whose edge, that projects a little beyond the frame, composes a shallow groove 2, wherein runs a catgut 3; which, by twisting round, and then crossing over a brass pulley 4, (the handle whereof, 5, passes through the frame), affords an easy motion for turning round the circular piece of wood B, with all the parts affixed to it. C is a brass tube, which, screwing into the middle of the circular piece of wood, becomes a case for the uncovered brass tube D to be drawn backwards or forwards in. E is a smaller tube, of about one inch in length, cemented to the end of the larger tube D. F is another brass tube, made to slide over the above described tube E; and to the end of this the microscope must be screwed when we come to use it. 5. A convex lens, whose focus is about twelve inches, designed to collect the sun's rays, and throw them more strongly upon the object. G is a looking-glass of an oblong figure, set in a wooden frame, fastened by hinges in the circular piece of wood B, and turning about therewith by means of the above-mentioned catgut. H is a jointed wire, partly brass and partly iron; the brass part whereof, 6, which is flat, being fastened to the mirror, and the iron part, 7, which is round, passing through the wooden frame, enable the observer, by putting it backwards or forwards, to elevate or depress the mirror according to the sun's altitude. There is a brass ring at the end of the jointed wire 8, whereby to manage it with the greater ease. The extremities of the cat-gut are fastened to a brass pin, by turning of which it may be braced up, if at any time it becomes too slack.

When this microscope is employed, the room must be rendered as dark as possible; for on the darkness of the room, and the brightness of the sunshine, depend the sharpness and perfection of your image. Then putting the looking-glass G through the hole in your window-shutter, fasten the square frame A to the shutter by its two screws and nuts 1, 1. This done, adjust your looking-glass to the elevation and situation of the sun, by means of the jointed wire H, together with the cat-gut and pulley, 3, 4. For, the first of these raising or lowering the glass, and the other inclining it to either side, there results a twofold motion, which may easily be so managed as to bring the glass to a right position, that is, to make it reflect the sun's rays directly through the lens 5, upon the paper screen, and form thereon a spot of light exactly round. But though the obtaining a perfect circular spot of light upon the screen before you apply the microscope is a certain proof that your mirror is adjusted right, that proof must not always be expected; for the sun is so low in winter, that, if it shine in a direct line against the window, it cannot then afford a spot of light exactly round; but, if it be on either side, a round spot may be

obtained, even in December. As soon as this appears, screw the tube C into the brass collar provided for it in the middle of your wood-work, taking care not to alter your looking-glass: then screwing the magnifier you choose to employ to the end of your microscope in the usual manner, take away the lens at the other end thereof, and place a slider, containing the objects to be examined, between the thin brass plates, as in the other ways of using the microscope. Things being thus prepared, screw the body of the microscope over the small end E of the brass tube F; which slip over the small end E of the tube D, and pull out the said tube D less or more as your object is capable of enduring the sun's heat. Dead objects may be brought within about an inch of the focus of the convex lens 5; but the distance must be shortened for living creatures, or they will soon be killed.

If the light fall not exactly right, you may easily, by a gentle motion of the jointed wire and pulley, direct it through the axis of the microscopic lens. The short tube F, to which the microscope is screwed, renders it easy, by sliding it backwards or forwards on the other tube E, to bring the objects to their focal distance; which will be known by the sharpness and clearness of their appearance: they may also be turned round by the same means, without being in the least disordered.

The magnifiers most useful in the solar microscope are in general the fourth, fifth, or sixth. The screen on which the representations of the objects are thrown is usually composed of a sheet of the largest elephant paper, strained on a frame which slides up or down, or turns about at pleasure on a round wooden pillar, after the manner of some fire-screens. Larger screens may also be made of several sheets of the same paper pasted together on cloth, and let down from the ceiling with a roller like a large map.

"This microscope (says Mr. Baker) is the most entertaining of any; and perhaps the most capable of making discoveries in objects that are not too opaque: as it shows them much larger than can be done any other way. There are also several conveniences attending it, which no other microscope can have: for the weakest eyes may use it without the least straining or fatigue: numbers of people together may view any object at the same time; and, by pointing to the particular parts thereof, and discoursing on what lies before them, may be able better to understand one another, and more likely to find out the truth than in other microscopes, where they must peep one after another, and perhaps see the object neither in the same light nor in the same position. Those, also, who have no skill in drawing, may, by this contrivance, easily sketch out the exact figure of any object they have a mind to preserve a picture of; since they need only fasten a paper on the screen, and trace it out thereon either with a pen or pencil, as it appears before them. It is worth the while of those who are desirous of taking many draughts in this way to get a frame, wherein a sheet of paper may be put in or taken out at pleasure; for, if the paper be single, the image of an object will be seen almost as plainly on the back as on the fore-side; and, by standing behind the screen, the shade of the hand will not obstruct the light in drawing, as it must in some degree when one stands before it." This construction, however, has now become rather obsolete, and is superseded by the following.

II. *The improved Solar Microscope, as used with the improved Single Microscope, with teeth and pinion.* Fig. 22, represents the whole form of the single microscope; the parts of which are as follows: ABCD the external tube; GHIK the internal moveable one; QM part of another tube within the last, at one end of which is fixed a plate of brass hollowed in the middle, for receiving the glass tubes: there is also a moveable flat plate, between which and the fixed end of the second tube the ivory sliders are to be placed. L, a part of the microscope, containing a wire spiral spring, keeping the tube QM with its plates firm against the fixed part IK of the second tube.

EF is the small rack-work of teeth and pinion, by which the tube IG is moved gradually to or from the end AB, for adjusting the objects exactly to the focus of different lengths. NO is a brass slider, with six magnifiers; any one of which may easily be placed before the object. It is known when either of the glasses is in the centre of the eye-hole, by a small spring falling into a notch in the side of the slider made against each of the glasses. Those parts of the apparatus, fig. 14, (Pl. 109.) marked No. 15, 16, 17, 18, 19, 20, 21 and 22, are made use of here to this microscope. GH is a brass cell, which holds an illuminating glass for converging the sun's beams or the light of a candle strongly upon the objects. The aperture of the glass is made greater or less, by two circular pieces of brass, with holes of different sizes, that are screwed separately over the said lens. But, at times, objects appear best when the microscope is held up to the common light only, without this glass. It is also taken away when the microscope is applied to the apparatus now to be described.

Fig. 23, represents the apparatus with the single microscope screwed to it, which constitutes the solar microscope. AB is the inner moveable tube, to which the single microscope is screwed. CD is the external tube, containing a condensing convex glass at the end D, and is screwed into the plate EF, which is cut with teeth at its circumference, and moved by the pinion I, that is fixed with the plate GH. This plate is screwed fast against the window-shutter, or board fitted to a convenient window of a darkened room, when the instrument is used. KL is a long frame, fixed to the circular plate EF; containing a looking-glass or mirror for reflecting the solar rays through the lens in the body of the tube D. O is a brass milled head, fastened to a worm or endless screw; which on the outside turns a small wheel, by which the reflecting mirror M is moved upwards or downwards.

In using this microscope, the square frame GH is first to be screwed to the window-shutter, and the room well darkened: which is best done by cutting a round hole of the size of the moveable plate EF, that carries the reflector in the window-shutter or board; and, by means of two brass nuts *a a*, let into the shutter to receive the screws PP, when placed through the holes in the square frame GH, at the two holes QQ; which will firmly fasten the microscope to the shutter, and is easily taken away by only unscrewing the screws PP.

The white paper screen, or white cloth, to receive the images, is to be placed several feet distant from the window; which will make the representations the larger in proportion to the distance. The usual distances are from 6 to 16 feet.

The frame KL, with its mirror M, is to be moved by turning the pinion I, one way or the other, till the beams of the sun's light come through the hole into the room: then, by turning of the worm at O, the mirror must be raised or depressed

till the rays become perfectly horizontal, and go straight across the room to the screen. The tube CD, with its lens at D, is now to be screwed into the hole of the circular plate EF: by this glass the rays will be converged to a focus; and from thence proceed diverging to the screen, and there make a large circle of light. The single microscope, fig. 22. is to be screwed on to the end AB (fig. 23.) of the inner tube; and the slider NO, with either of the lenses marked 1, 2, 3, 4, 5, or 6, in the centre hole at the end AB. This will occasion a circle of light upon the screen much larger than before. The slider or glass-tube, with the objects to be viewed, is to be placed between the plates at IK against the small magnifier, and moved at pleasure. By shifting the tube AB in or out, you may place the object in such a part of the condensed rays as shall be sufficient to illuminate it, and not scorch or burn it; which will generally require the glass to be about one inch distant from the focus. It now remains only to adjust the object, or to bring it so near to the magnifier that its image formed upon the screen shall be the most distinct or perfect: and it is effected by gently turning the pinion F, fig. 22, a small matter one way or the other. If the object be rather large in size, the least magnifiers are generally used, and *vice versa*.

No. 1. is the greatest magnifier, and No. 6. the least, in the brass slider NO. But if desired, single lenses of greater magnifying powers are made: and they are applied by being screwed to the end A B, fig. 12. and the brass slider NO is then taken away.

The same object may be variously magnified by the lenses severally applied to it; and the degree of magnifying power is easily known by this rule: *As the distance of the object is to that of its image from the magnifier; so is the length or breadth of the object to that of the image.*

Instead of the brass sliders with the lenses NO, there is sometimes screwed a lens of a large size, and longer focal distance: the instrument is then converted into a megalascope; and is adapted for viewing the larger kind of objects contained in large sliders, such as is represented at R. And, in the same manner, small objects of entertainment, painted upon glass like the sliders of a magic lanthorn, are much magnified, and represented upon the same screen.

The solar microscopes just described are capable only of magnifying transparent objects; for which purpose the last instrument is extremely well adapted. But as opaque objects form the most considerable part of the curious collections in the works of art as well as nature, a solar microscope for this purpose was a long time wanted.—For several years previous to 1774, the late Mr. Martin made several essays towards the construction of such an instrument; and at last completed one about the time just mentioned, which he named,

III. *The Opaque Solar Microscope.* "With this instrument (to use his own words) all opaque objects, whether of the animal, vegetable, or mineral kingdom, may be exhibited in great perfection, in all their native beauty; the lights and shades, the prominences and cavities, and all the varieties of different hues, tints, and colours; heightened by reflection of the solar rays condensed upon them." Transparent objects are also shown with greater perfection than by the common solar microscope.

Fig. 24. represents the solar opaque microscope, mounted for exhibiting opaque objects.

Fig. 25. is the single tooth-and-pinion microscope, as before, which is used for showing transparent objects; the cylindrical tube Y thereof being made to fit into the tube FE of the solar microscope.

ABCDEF (fig 24.) represents the body of the solar microscope; one part thereof, ABCD, is conical; the other, CDEF, is cylindrical. The cylindrical part receives the tube G of the opaque box, or the tube Y of the single microscope. At the large end AB of the conical part there is a lens to receive the rays from the mirror, and refract them towards the box HIKL. NOP is a brass frame, which is fixed to the moveable circular plate *a b c*: in this frame there is a plane mirror, to reflect the solar rays on the aforementioned lens. This mirror may be moved into the most convenient position for reflecting the light, by means of the nuts Q and R. By the nut Q it may be moved from east to west; and it may be elevated or depressed by the nut R. *d e*, Two screws to fasten the microscope to a window-shutter. The box for opaque objects is represented at HIKL: it contains a plane mirror M, for reflecting the light which it receives from the large lens to the object, and thereby illuminating it; S is a screw to adjust this mirror, or place it at a proper angle for reflecting the light. VX, two tubes of brass, one sliding within the other, the exterior one in the box HIKL; these carry the magnifying lenses: the interior tube is sometimes taken out, and the exterior one is then used by itself. Part of this tube may be seen in the plate within the box HIKL. At H there is a brass plate, the back part of which is fixed to the hollow tube *h*, in which there is a spiral wire, which keeps the plate always bearing against the side H of the brass box HIKL. The sliders, with the opaque objects, pass between this plate and the side of the box; to put them there, the plate is to be drawn back by means of the nut *g*: *i k* is a door to one side of the opaque box. The foregoing pieces constitute the several parts necessary for reviewing opaque objects. We shall now proceed to describe the single microscope, which is used for transparent objects: but in order to examine these, the box HIKL must be first removed, and in its place we must insert the tube Y of the single microscope that we are now going to describe.

Fig. 25. represents a large tooth-and-pinion microscope: at *m*, within the body of this microscope, are two thin plates, that are to be separated, in order to let the ivory sliders pass between them; they are pressed together by a spiral spring, which bears up the under plate, and forces it against the upper one.

The slider S (under fig. 24.), which contains the magnifiers, fits into the hole *n*; and any of the magnifiers may be placed before the object by moving the aforesaid sliders: when the magnifier is at the centre of the hole P, a small spring falls into one of the notches which is on the side of the slider.

Under the plate *m* are placed two lenses, for enlarging the field of view on the screen: the smaller of the two is fixed in a piece of brass, and is nearest the plate *m*; this is to be taken out when the magnifiers, No. 4, 5, or 6, are used, or when the megalascope lens T (fig. 24.) is used; but is to be replaced for No. 1, 2, 3.

This microscope is adjusted to the focus by turning the milled nut O.

To *use* the solar microscope:—Make a round hole in the window-shutter, a little larger than the circle *a b c*; pass the mirror ONP through this hole, and apply the square plate to the shutter; then mark

with a pencil the places which correspond to the two holes through which the screw is to pass; take away the microscope, and bore two holes at the marked places, sufficiently large to let the milled screws *de* pass through them.

The screws are to pass from the outside of the shutter, to go through it; and being then screwed into their respective holes in the square plate, they will, when screwed home, hold it fast against the inside of the shutter, and thus support the microscope.

Screw the conical tube ABCD to the circle *a b c*, and then slide the tube G of the opaque box into the cylindrical part CDEF of the body, if opaque objects are to be examined; but if they be transparent objects you mean to show, then place the tube Y within the tube CDEF.

The room is to be darkened as much as possible, that no light may enter but what passes through the body of the microscope; for on this circumstance, together with the brightness of the sunshine, the perfection and distinctness of the image in a great measure depend.

When the microscope is to be used for opaque objects, 1. Adjust the mirror NOP, so as to receive the solar rays, by means of the two finger screws or nuts, Q R; the first, Q, turns the mirror to the right or left; the second, R, raises or depresses it: this you are to do till you have reflected the sun's light through the lens at AB strongly upon a screen of white paper placed at some distance from the window, and formed thereon a round spot of light. An unexperienced observer will find it more convenient to obtain the light by forming this spot before he puts on either the opaque box or the tooth-and-pinion microscope.

Now put in the opaque box, and place the object between the plates at H; open the door *ik*, and adjust the mirror M till you have illuminated the object strongly. If you cannot effect this by the screw S, you must move the screws Q, R, in order to get the light reflected strongly from the mirror NOP, or the mirror M, without which the latter cannot illuminate the object.

The object being strongly illuminated, shut the door *ik*, and a distinct view of the object will soon be obtained on your screen, by adjusting the tubes VX, which is effected by moving them backwards or forwards.

A round spot of light cannot always be procured in northern latitudes, the altitude of the sun being often too low; neither can it be obtained when the sun is directly perpendicular to the front of the room.

As the sun is continually changing its place, it will be necessary, in order to keep his rays full upon the object, to keep them continually directed, through the axis or the instrument, by the two screws Q and R.

To view transparent objects, remove the opaque box, and insert the tube Y, fig. 25. in its place; put the slider S into its place at *n*, and the slider with the objects between the plates at *m*; then adjust the mirror NOP, as before directed by the screws Q, R, so that the light may pass through the object; regulate the focus of the magnifier by the screw O. The most pleasing magnifiers in use are the fourth and fifth.

The size of the object may be increased or diminished by altering the distance of the screen from the microscope: five or six feet is a convenient distance.

To examine transparent objects of a larger size, or to render the instrument what is usually called a megalascope, take out the slider S from its place at *n*, and screw the button T (fig. 24.) into the hole at P, fig. 25. and remove the glass which is under the plate at *m*, and regulate the light and focus agreeable to the foregoing directions.

N. B. At the end of the tube G there is a lens for increasing the density of the rays, for the purpose of burning or melting any combustible or fusible substance: this lens must be removed in most cases, lest the objects should be burnt. The intensity of the light is also varied by moving this tube backwards or forwards.

The scales of fishes afford a great variety of beautiful objects for the microscope. Some are long; others are round, square, &c. varying considerably not only in different fishes, but even in different parts of the same fish. Leeuwenhoeck supposed them to consist of an infinite number of small scales or strata, of which those next to the body of the fish are the largest. When viewed by the microscope, we find some of them ornamented with a prodigious number of concentric flutings, too near each other, and too fine to be easily enumerated. These flutings are frequently traversed by others diverging from the centre of the scale, and generally proceeding from thence in a straight line to the circumference.

For full information concerning these and other microscopical objects, the reader may consult Mr. Jones's new edition of Adams's Essays on the Microscope, where the most valuable collection that has yet appeared on the subject may be found. See also the articles ANIMALCULE, CRYSTALLIZATION, POLYPE, PLANTS, and WOOD, in the present work.

MICROSCO'PICAL. MICROSCO'PIC. *a.* (from *microscope.*) 1. Made by a microscope (*Arbuthnot*). 2. Assisted by a microscope (*Thomson*). 3. Resembling a microscope (*Pope*).

MICROTEA, in botany, a genus of the class pentandria, order digynia. Calyx five-leaved, spreading; corolless; drupe dry, coriaceous, echinate. One species, a West Indian plant with weak diffuse stem, and white minute flowers.

MID. *a.* (contracted from *middle.*) 1. Middle; equally between two extremes. 2. It is much used in composition.

MIDAS, in fabulous history, a king of Phrygia, son of Gordius or Gorgias. In consequence of the hospitality he shewed to Silenus, the preceptor of Bacchus, who had been brought to him by some peasants, he was permitted by the god to choose whatever recompence he pleased. He had the avarice to demand that whatever he touched might be turned into gold. His prayer was granted, but when the very meats which he attempted to eat became gold in his mouth, he begged Bacchus to take away so fatal a present. He was then ordered to wash himself in the river Pactolus, whose sands were turned into gold by the touch of Midas. Some time after this adventure Midas supported that Pan was superior to Apollo in singing and playing upon the flute, for which rash opinion the offended god changed his ears into those of an ass, to shew his ignorance and stupidity. This Midas attempted to conceal; but one of his servants saw the length of his ears, and opened a hole

in the earth, and after he had whispered there that Midas had the ears of an ass, he covered the place as before. On that place, as the poets mention, grew a number of reeds, which, when agitated by the wind, uttered the same sound that had been buried beneath, and published to the world that Midas had the ears of an ass.

MID-COURSE. *s.* (*mid* and *course.*) Middle of the way (*Milton*).

MI'DDAY. *a.* (*mid* and *day.*) Meridional; being at noon (*Sidney*).

MIDDAY. *s.* Noon; meridian (*Donne*).

MI'DDEST. The superl. of *mid* (*Spenser*).

MI'DDLE. *a.* (mıððle, Saxon.) 1. Equally distant from the two extremes (*Swift*). 2. Intermediate; intervening (*Davies*). 3. *Middle* finger; the long finger (*Sharp*).

MI'DDLE. *s.* 1. Part equally distant from two extremities; the part remote from the verge (*Judges*). 2. The time that passes, or events that happen, between the beginning and end (*Dryden*).

MI'DDLE-AGED. *a.* (*middle* and *age.*) Placed about the middle of life (*Swift.*)

MI'DDLEMOST. *a.* (from *middle.*) Being in the middle (*Newton*).

MI'DDLING. *a.* (from *middle.*) 1. Of middle rank; of condition equally remote from high and low (*L'Estrange*). 2. Of moderate size; having moderate qualities of any kind (*Graunt*).

MIDDLEBURG, a large and strong commercial city of the United Provinces, capital of the island of Walcheren, and of all Zealand. The squares and public buildings are magnificent. The Dutch took it from the Spaniards in 1574, after a siege of 22 months. The English took it from the Dutch in the summer of 1809; but soon abandoned it. The inhabitants are computed at 26,000. The harbour is large and commodious, and has a communication with the sea by a canal, which will bear the largest vessels. It is 20 miles N.E. of Bruges, 30 N.W. of Ghent, and 72 S.W. of Amsterdam. Lon. 3. 39 E. Lat. 51. 32 N.

MIDDLEBURG, a town of Dutch Flanders, which belongs to the prince of Issenghein. It is five miles S.E. of Sluys. Lon. 3. 26 E. Lat. 51. 15 N.

MIDDLEBURG. See EAOOWE.

MIDDLEHAM, a town of England, in the North-riding of the county of York, with a weekly market on Monday: twenty-six miles NW. Boroughbridge, and 229 N. London.

MIDDLESEX, a county of England, bounded on the north by Hertfordshire, on the east by Essex, from which it is separated by the river Lea, on the south by Surrey, and a small part of Kent, from both which it is separated by the river Thames, and on the west by Buckinghamshire, from which it is separated by the river Coln and a small part of Surrey, about twenty-four miles in length, and about fourteen in breadth. It is divided into six hundreds, and contains two cities, London and Westminster, seven market towns, and about 200 parishes, without including those in the cities. This county, although one of the smallest, is the richest and most populous in the kingdom. The soil in general is loamy, in some places tending to gravel, in some to clay, in others to sand; in the neighbourhood of London, where manure is easily to be obtained, the land is mostly employed in gardens and nurseries, or laid down to grass. At a farther distance, especially towards Buckinghamshire, there are some considerable tracts of arable land, which produce good crops of corn. There are some very extensive meadows on the side of the rivers Thames, Lea, and Coln. The number of cows kept by the London cow-keepers, for the supply of the metropolis with milk in the county of Middlesex, is about 7200, besides 1300 kept on the other side of the Thames, in Surrey and Kent; each of these cows is supposed to produce eight quarts of milk a day, on an average. The towns are Barnet, Brentford, Edgeware, Enfield, Hounslow, Stanes and Uxbridge. Middlesex sends eight members to the British parliament, that is, two for the county, four for London, and two for Westminster.

MIDDLESEX, a county of United America, in the state of Massachusetts.

MIDDLETON (sir Hugh), an English projector, was a native of Denbigh in North Wales, and a citizen of London. He undertook to conduct the New River, consisting of the union of two streams in Middlesex and Hertfordshire, to London, which work was begun in 1608. In this great scheme he spent his whole fortune, and impoverished himself. James I. who greatly patronized the plan, conferred on him the honour of knighthood. He died in the reign of Charles I.

MIDDLETON (Conyers), a famous English divine, was the son of a clergyman, and born at York in 1683. He was bred at Trinity college, Cambridge, of which he was chosen fellow in 1706. In 1717 he was created D.D. by mandamus, on which occasion happened the famous law-suit with Dr. Bentley, respecting his right to fees. Of this affair Dr. Middleton, who was a zealous stickler against Bentley, published an account. He afterwards attacked that learned critic's proposals for a new edition of the Greek Testament in such a manner, that the design was laid aside. In 1724 Middleton travelled to Italy, which occasioned his well-known letter from Rome, shewing the exact conformity between popery and paganism. In 1730 he published a letter to Dr. Waterland, containing remarks on his Vindication of Scripture, which was attacked by Dr. Pearce and others, who charged Middleton with being an infidel in disguise, and he had some difficulty to escape academical censures. The year following he was appointed Woodwardian professor, but resigned the place in 1734. In 1735 he published a Dissertation concerning the Origin of Printing in England, 4to. In 1741 appeared his capital performance, the History of the Life of M.

Tullius Cicero, in 2 vols. 4to.; perhaps one of the completest pieces of biography ever written. In 1743 he published the Epistles of Cicero to M. Brutus, and those of Brutus to Cicero, in Latin and English, with a vindication of their authenticity. In 1747 he printed a work which produced a flaming controversy; it was entitled, A Discourse concerning the Miraculous Powers which are supposed to have subsisted in the Christian Church from the earliest Ages. This performance gave great alarm to the clergy, and to many serious Christians of all denominations; and numerous answers were published to it. He died in 1750; and in 1752 appeared all his works, except the Life of Cicero, in 4 vols. 4to.

MIDDLETON, a commercial town of the state of Connecticut, seated on the river Connecticut, 15 miles S. of Hartford. It is one of the county towns of Middlesex.

MIDDLETOWN, a town of the state of New Jersey, and adjoining Shrewsbury, in the county of Monmouth. Sandy Hook (so called from its shape and soil) is included in this township. On the point of the Hook stands the light-house, 100 feet high, built by the city of New York. Middletown is 30 miles S.W. of New York, and 50 E. by N. of Trenton.

MIDDLEWICH, a town of Cheshire, 167 miles from London. It stands near the conflux of the Croke and Dan, where are two salt-water springs, from which are made great quantities of salt, the brine being said to be so strong as to produce a full fourth part salt. It is an ancient borough, governed by burgesses; and its parish extends into many adjacent townships. It has a spacious church. Its market is on Tuesdays; and fairs on St. James's day, July 25, and Holy-Thursday. By the late inland navigation, it has communication with the rivers Mersey, Dee, Ribble, Ouse, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Lancaster, Westmoreland, Stafford, Warwick, Leicester, Oxford, Worcester, &c. The river Wheelock, after a course of about 12 miles from Mow-cop-hill, runs into the Dan a little above this town.

MIDGE. *s.* (micʒe, Saxon.) A gnat.

MID-HEAVEN. *s.* (*mid* and *heaven.*) The middle of the sky (*Milton*).

MIDHURST, a town of Sussex, 52 miles from London, has been represented in parliament ever since the 4th of Edward II. It is a neat small town, on a hill surrounded with others, having the river Arun at the bottom; and is a borough by prescription, governed by a bailiff, chosen annually by a jury at a court-leet of the lord of the manor. The market is on Thursday; fairs on March 21, and the Thursday after.

MIDIAN, or MADIAN (anc. geog.), a town on the south side of Arabia Petræa; so called from one of the sons of Abraham by Keturah.—Another Midian, near the Arnon and Æoplis, in ruins in Jerome's time. With the daughters of these Midianites the Israelites committed fornication, and were guilty of idolatry.

MI'DLAND. *a.* (*mid* and *land.*) 1. That is remote from the coast (*Hale*). 2. Surrounded by land; mediterranean (*Dryden*).

MI'DLEG. *s.* (*mid* and *leg.*) Middle of the leg (*Bacon*).

MID-LOTHIAN. See LOTHIAN.

MI'DMOST. *a.* (from *mid.*) Middle.

MI'DNIGHT. *s.* (*mid* and *night.*) The noon of night; the depth of night; twelve at night (*Atterbury*).

MI'DNIGHT. *a.* Being in the middle of the night (*Bacon*).

MID-RIB, in botany, the main nerve or middle rib of the leaf, running from the base or petiole to the apex, and from which the veins of the leaf usually arise and spread. See RACHIS, and RIB.

MI'DRIFF. *s.* (mıðhpıꝼe, Saxon.) The diaphragm (*Milton.*)

MID-SEA. *s.* The Mediterranean sea (*Dryden*).

MIDSHIP-FRAME, a name given to that timber, or combination of pieces formed into one timber, which determines the extreme breadth of the ship, as well as the figure and dimension of all the inferior timbers.

MIDSHIPMAN, a sort of naval cadet, appointed by the captain of a ship of war to second the orders of the superior officers, and assist in the necessary business of the vessel, either aboard or ashore.

The number of midshipmen, like that of several other officers, is always in proportion to the size of the ship to which they belong. Thus a first-rate man of war has 24, and the inferior rates a suitable number in proportion. No person can be appointed lieutenant without having previously served two years in the royal navy in this capacity, or in that of mate, besides having been at least four years in actual service at sea, either in merchant-ships or in the royal navy.

Midshipman is accordingly the station in which a young volunteer is trained in the several exercises necessary to attain a sufficient knowledge of the machinery, movements, and military operations of a ship, to qualify him for a sea officer.

MIDST. *s.* Middle (*Taylor*).

MIDST. *a.* (from *middest.*) Midmost; being in the middle (*Dryden*).

MIDSTRE'AM. *s.* (*mid* and *stream.*) Middle of the stream (*Dryden*).

MI'DSUMMER. *s.* (*mid* and *summer.*) The summer solstice (*Swift*).

MI'DWAY. *s.* (*mid* and *way.*) The part of the way equally distant from the beginning and end (*Shakspeare*).

MI'DWAY. *a.* Being in the middle between two places (*Shakspeare*).

MI'DWAY. *ad.* In the middle of the passage (*Dryden*).

MI'DWIFE. *s.* (mıꝺ *and* pıꝼ, Sax.) A woman who assists women in childbirth (*Donne*).

MIDWIFERY. (by Skinner and Junius derived from mıꝺ, or meed, a reward, and pıꝼ, a wife, Sax. literally, therefore, wife-fee.) In a more rigid sense the art or science of assisting women in child-birth; but in a larger sense, and as it is now more generally professed, lectured upon, and practised, the art or science of assisting females in every affection connected with the sexual system, and infants during the period of lactation.

Such, therefore, being the general signification assigned to the term in the present day, we shall contemplate it under this sense in the following sketch of its rise, progress, and practice; availing ourselves of the observations the writer of this article has already offered to the public upon the same subject in a similar work of high respectability published about two years since, and which he is happy to find have met with much general approbation.

## History.

The history of midwifery may be comprised in a few words. In the earliest ages of the world, when the manners were simple, the hours of rest and food regular, and the general strength and health proportionate, it was only in cases of mal-conformation either of the mother or of the child, or mispresentation of the latter, that any other assistance, perhaps, than what nature herself either gave or indicated could be demanded. These cases, even in the present day of luxury, complex manners, and delicate health, are, upon the whole, extremely few, compared with the general average of births that every hour is a witness to. Yet in the periods we are now contemplating, we know that they must have been very considerably fewer, because we know that in every instance in which society, by its natural tendency, has overstepped the just medium of its prime object, and introduced soft and delicate habits, capricious fashions, and all the luxuries of refined life, it has at the same time introduced debility even from birth, and often before birth; and, consequently, all those mal-conformations and obliquities from the line of health which naturally belong to mankind of both sexes, and which it is their own fault (we mean the fault of themselves or their ancestors) that they do not equally possess in every generation.

Hence the art of midwifery is coeval with civilized life, and is to be measured by its advance to the utmost summit of refinement. In the earliest ages, when nature required nothing more than mere co-operation with her common efforts, women alone, and those of no peculiar degree of skill, must have been altogether competent to the business of child-birth: and hence the midwives of the Hebrews, of the Greeks, and Romans, we have reason to believe were all females. Nor do we meet with a single instance of a chirurgical or medical practitioner having been had recourse to and actually employed earlier than the middle of the seventeenth century, perhaps, among the earliest practitioners on the continent, by M. Julian Clement, a surgeon of high reputation at Paris, who attended in a difficult case Madame de la Valiere, in 1663; and Dr. William Harvey in our own country, who published his celebrated treatise on generation a few years antecedently, and a few years afterwards engaged in the practice of midwifery, and followed up his practice with his Exercitatio de Partu.

There can be no doubt that midwifery ought to have been studied and practised scientifically many ages before the period at which we have now arrived, and that thousands of lives, as well of mothers as of children, must have fallen a sacrifice to the want of anatomical skill and knowledge upon this subject. Luxury, extravagance, and dissipation were as common at Athens and Rome, during some periods of their history, as they have been in any part of Europe during the last two centuries; and though it is probable the Athenian and Roman matrons did not, from the fashion of their respective æras, run quite so readily as the ladies of the present day into all the excesses of the men, yet there can be no doubt that the example was contagious, and that the result in regard to debility of frame, and consequently occasional malconformation of organs, if not equal in point of frequency and degree, could not have essentially varied. And in reality, had the Greek and Roman ladies been as correct and regular as possible in their own lives, yet from the necessity they must have been too frequently under of intermarrying with men of far less correctness and regularity, the female offspring hence ensuing could not fail to inherit much of the same kind of delicacy and debility of frame, and consequently misproportion of construction, which we too frequently witness in the present day.

Still, however, it was the fashion to employ women, and none but women, in the momentous process of childbirth, notwithstanding the necessity of a contrary practice. Natural modesty, not always in league with fashion, gave additional force to the general custom; and imperious as was the call for the occasional employment of persons who had been regularly taught at the schools of anatomy, and had hence acquired a scientific knowledge of the organs concerned in gestation and labour, and of the changes they undergo during these respective processes,—life was in general rather to be sacrificed than a male practitioner of surgery to be resorted to. That the call for such assistance was imperious, we could adduce a thousand instances to prove, if it were necessary; we shall only observe that Agnodice, a scholar of Hierophilus, in order to acquire a knowledge of this branch of anatomy, and finding herself prohibited, either by the common law of custom, or the written law of the state, from acquiring such knowledge in her own sex, consented to assume a male appearance, and for this purpose cut off her hair, exchanged her female for male attire, and in this disguise attended the lectures of this celebrated physician. She then publicly entered upon her profession; but another difficulty occurred to her, which was, that from the dress and appearance she had so long assumed, she was still suspected to be a man, notwithstanding she had returned to the common dress of her sex; and it was long before the prejudice thus excited was completely overcome.

On these accounts the art of midwifery made less improvement than any other branch of medicine. Hippocrates says but little upon the subject, and that little but very little to the purpose. He appears to have known of no other method of delivery than by a presentation of the child's head; if any other part presented, he advises such part to be turned, and this not by an introduction of the hand of the practitioner into the uterus, but by shaking

the mother, by making her jump repeatedly, or by rolling her on her bed, and if this do not succeed, to destroy the child and deliver it piece-meal. In the writings of Celsus, however, who flourished during the reign of Tiberius, we find hints that prove some advance had been made towards a more humane, scientific, and successful practice; for we are here told, that children may be safely and easily delivered in presentations of the feet as well as of the head, by taking hold of the legs and dragging them downwards: as also that if any other parts present than the head or feet, the child must be turned in the uterus by the introduction of the assistant's hand, so that one or the other of these organs be brought forwards into the vagina. We also meet with another piece of advice which we are sorry to perceive has been of so long standing in the world, and which is very injudiciously praised and practised in the present day, and that is, that the practitioner ought to be perpetually striving to dilate the *os tincæ*, or orifice of the womb, by the introduction of the fore-finger alone, when the opening is only large enough to admit a single finger, smeared over with lard or pomatum, and that he should continue progressively to introduce two, three, and, at length, the whole hand, as a general dilater to the orifice, so that the head, or whatever other part of the child presents, may the more readily pass through. Now it is comparatively very seldom that any benefit can be derived from this perpetual tampering; in some few cases of relaxed uteri, where the orifice is already sufficiently enlarged to allow three or four fingers to enter at once, and the pains at the same time are but feeble, or at least have but a small propulsive power, some advantage may be obtained, but none in any instance when the orifice is not large enough to admit of more than a single finger; while in every such attempt, provided the uterus be rigid and unpliable, instead of facilitating the enlargement, the practitioner will considerably obstruct it, his perpetual stimulus continually thickening and indurating the edges of the orifice.

Yet delivering by the feet appears by no means to have been approved by the profession in general. Celsus, though an admirably informed man, and an excellent writer, was not of the profession, while Galen, who was of it, condemned the practice as decidedly as Hippocrates. In reality we meet with the same kind of general condemnation as late as to the middle of the seventeenth century; for Riverius censured it publicly in 1657, and though Mauricean inclined to it in his own practice, as he informs us in his treatise on midwifery, published in 1664, he tells us at the same time that many authors were of opinion, that in all foot-cases it would be better to attempt to turn the child than to deliver with such a presentation. So slow is the world to shake off a prejudice of any kind when once deeply rooted, however unfounded or even fatal.

About this period several tracts or treatises on midwifery in Great Britain issued from the pens of Wharton, Charleton, Mayow, and Raynold, of all which the last appears to have been the most celebrated writer. To the instrument called the crotchet, which had been long in use, but most commonly for removing the mangled limbs of a child whom it was thought necessary to destroy, we now find added, generally supposed to have been an invention of Chamberlen, a *forceps* of a peculiar kind, having a near resemblance to what is now denominated a *vectis*:—the employment of male practitioners grew common, books of real science, and containing information of the most valuable description, issued freely from the press, and especially from the labours of Chamberlen, Willoughby, Bamber, and Simpson; lectures of reputation upon the subject of midwifery were instituted, and largely attended, a variety of ingenious instruments were devised and multiplied, and the first public description of the modern *forceps* was given by Chapman, the second public teacher of midwifery in London, which made its appearance in the third volume of the Edinburgh Medical Essays. It is useless to pursue this narrative any farther: the names of Smellie, Hamilton, Orme, and Denman, are known to every one; and their instructions have been widely felt and duly appreciated, not only by the profession, but by the world at large.

Diseases of the female sexual system. From a cause that has never yet been explained, women on the commencement of puberty throw forth at monthly intervals a peculiar and coloured fluid from the uterus, which terms of discharge only cease, or only should cease, during pregnancy, and lactation, till the age of about forty-five in this country, and others of similar warmth, though the age at which it ceases is much earlier in countries of greater heat, and where the general form acquires a much earlier maturity. At the commencement of this natural or regular flow which is usually denominated menses or menstruation, women are often subject to many diseases from the change that takes place in the constitution at that period: they are subject to other diseases from a morbid suppression, or too large or too frequent an evacuation of this discharge; and again to others, at the period of their final cessation.

We shall first examine into the nature of the menstrual fluid itself. It was formerly supposed that this fluid was a kind of surplus blood thrown out of the system from the mouths of minute veins. It has been clearly ascertained, however, by Dr. W. Hunter that this fluid, whatever it is, is thrown from the mouths not of the uterine veins, but the uterine arteries; and that instead of being blood, it has scarcely any one property in common with blood, excepting indeed in its colour. Generally speaking, the average time the discharge continues is three or four days; and as to the proportional quantity lost on each day, on the first, and fourth, or third day, the woman loses a fourth of the whole quantity each day, and, on the middle day, about the other half. The quantity lost will generally be three or four ounces altogether, a single ounce on the first day, two on the second, and the fourth and last ounce on the third day. There is nothing, however, more affected by the climate than this: in a warm climate the quantity being increased, while it is diminished in cold ones. Linnéus, while writing his account of Lapland, says, that the quantity lost there is never above half an ounce or an ounce. In hot islands, as in those of the Archipelago, Hippocrates writes, that the women lost twenty ounces of blood by this evacuation. Artificial warmth promotes the menstrual flux as powerfully as that of the sun.

The discharge, as we have already observed, commences with puberty, which varies exceedingly from climate.

In Persia the females are fit for all the purposes of women at ten years old. In Lapland not till twenty. In our country about sixteen; and this period is characterized by certain attendant circumstances: the age of puberty is evinced by hair growing on the pubes and in the axilla; the breasts

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are formed and made perfect; there is also a change in the ovaria.

The discharge when it first appears is not at first red, generally it is without colour. The succeeding periods are very regular, being every month, unless the woman lives in a state of nature, and falls with child, when, upon a pretty accurate calculation, she will menstruate about once in twenty months, if she suckles. Menstruation having begun will go on regularly unless interrupted by disease, or pregnancy, for a great number of years, generally till between the fortieth and fiftieth year; and the time of its cessation is generally regulated by the age at which it commenced. The final cessation of the menses may be known to be going by certain irregularities in the appearance: instead of the discharge lasting three, it will continue for ten days; nothing will then be seen for two months; next they may come once a fortnight, and then profusely.

Menstruation appears to be a discharge intended to preserve the uterus in a state fitted for conception, for a girl cannot conceive till after the menses have appeared; nor does any woman conceive after they have ceased to flow. So that women only can become pregnant while the menses continue; and they appear to be more susceptible of conception immediately before and directly after them than at any other part of the month. Also, in all animals there is a discharge somewhat analogous to it, which in them is called heat. This state is very nearly allied to it; and is well understood by boys, not one of whom when buying a doe rabbit will pay half the price for it, if not in heat, as if she is in heat: he has nothing to do, but by pressing with his thumb to invert a portion of the vagina, and if it is red and covered thickly with blood vessels, he knows it indicates heat, and is what he looks for; but if the vagina be smooth and white, any boy knows that he must keep that rabbit on bran and other expensive provision for a month, before she will take the buck.

Menstruation may be the subject of disease from irregularity, obstruction, excess, or painful extrusion.

*Irregular Menstruation.*—This may regard its time of accession or cessation. It may be irregular in its monthly return, or as to the quantity of fluid lost at each period; it may arise too early in life, or continue too late. The first consideration is, where it arises too early in life; perhaps, however, there is no such thing as menstruation beginning too early in life, except as connected with a complaint. It may arise from too great strength of constitution and vascular action; from increased fullness of vessels, depending on too large a quantity of animal food, for the wear and tear of the constitution. There is a full face; a full pulse; throbbing in the head; the breasts are full, with a warm imagination. This secretion arises properly at sixteen; but here it begins at twelve or thirteen. As in this case it arises from too much blood, we should take some away; prescribe purges and strong exercise; but the medicine must be chosen. Rhubarb, jalap, senna, colocynth, and aloes, are not calculated to diminish the quantity of blood; they only increase the peristaltic motion of the intestines. Saline purgatives should be preferred, and a spare diet must be insisted upon.

The other state of the menses is, where they stay too late; this is more common than the preceding affection, and more especially in large towns. It occurs where there is too little blood, and the uterus is not in a state fit for conception. The pulse is weak, the appetite disordered, the countenance pale, the constitution below par in point of strength. We will now consider both the states just described. The first will be liable to sudden inflammation of the lungs, and has that state of body which predisposes to what is called a galloping consumption. The other will generally be more or less a scrophulous habit, disposed to go into a decline, or slow consumption. Here the mode of treatment adopted in chlorosis may be superadded to that for the restoring health by sea-bathing, if the lungs are not any way affected, and the stomach in good order, but not where there is a weak stomach or oppressed respiration.

*Of Amenorrhœa,* or obstructed menstruation, there are two kinds; one the acute, or accidental; the other the chronic. The acute, or accidental, arises where there is perfect health up to the time of menstruating, and the patient takes cold at the point of discharge, or even while menstruating, and the flow is prevented or suddenly ceases.

Obstructed menstruation generally depends upon the application of cold; this will produce a fever which will stop it if coming on, and arrest its progress, where it has already commenced. In all such cases, there is pain in the head, back, and loins, pain in the limbs, with all the symptoms marking fever. If we know of this early, we may with ease give relief. We may always take blood, and clear the bowels: rhubarb is the best medicine; then a saline draught, with antimonials in such quantity as to come short of vomiting, and five or six drops of laudanum, or four or five grains of ipecacuanha every six hours. The warm bath is productive of advantage where applied soon after the complaint has begun. Where the slipper bath is not at hand, the lower part of the body may be seated in a volume of tepid water in a large tub, or the convenient vehicle called a hip bath, after which the patient must be made very dry, and put into a warm bed, and use the remedies before mentioned; and the discharge will return, or, if not immediately, it will ultimately return, and the health remain unimpaired: but, if the menstruating period is passed over, it then becomes a chronic obstruction, the symptoms attending which are very destructive of female health.

Of the chronic obstruction of menstruation there are also two kinds, which have each a distinct set of symptoms; those of plethora, and those of weakness; and chronic obstruction, depending on plethora, may degenerate into that kind depending on weakness. The patient will first be taken with symptoms which only belong to plethora, and after that arise those belonging to weakness. The young are most liable to the first kind, in whom the quantity of blood is much increased beyond what it should be, by luxurious habits, and where too little exercise is taken for the quantity of food; and even here it will not often lead to obstruction, unless the occasional cause is applied by taking cold: when this does reallyhappen, the attack of fever may be so slight as not to be observed by the patient. Where we see all the signs of the system being loaded with blood, we should certainly take some away: where the pulse is hard, full, strong, and frequent; the skin dry and hot, more thirst than there should be, with pain in the head, back, and loins; where, especially, instead of an active disposition, we see a desire to be always by the fire, and the girl at the same time liable to giddiness. Here the pulse is rarely up to 100, which being an increase of more than twenty beats in every minute, the effects of such increased action is, that

the strength will be worn out, and the chronic obstruction from plethora be changed into the chronic obstruction from weakness; the reason is this, that the action is so strong, that it may, by continuing, exhaust the powers of life: nothing indeed exhausts the strength of the system so much as increased action of the heart and arteries; for it is not the pulsating arteries alone that are affected, but in the same proportion is the action of all the capillary vessels in the body increased, so that the whole extent of increased action is prodigious. It being known that the action arising from obstructed menstruation with plethora brings on weakness, it might be expected that the strength of action would be brought gradually down to the point of health: but that never happens; it sinks below it. This sort of obstructed menstruation must be treated by evacuation, by bleeding; but the foot is not preferable, as we do not get blood enough by opening the vena saphena, unless the foot be immersed in warm water; and if this be done, we are unable to tell the quantity we take, unless we from time to time measure the water. The best way, then, is to bleed from the arm, and with bleeding to use purgative medicines: the patient should take much exercise and little sleep, and, on the intermediate day to those on which we give the purgatives, we should give a saline draught. The effect of this will be, that she will be brought down from great and morbid action to the state of health, and it is fifty to one but the menstrual discharge returns immediately.

This species of chronic obstruction proceeds from plethora: and plethora may exist so as to prevent menstruation, either at its earliest effort, or after it has been long in the regular habit of recurring. The term chlorosis is generally applied to the first kind; amenorrhœa to the second: but chlorosis, or green-sickness, is a mere result, and may result from either: it is that chronic menstruation depending on symptoms of weakness we have already noticed, and may result from each as well as from a distinct and separate source, because the continued action of vessels exhausts the strength. Usually however the complaint depends on improper food, living in bad air, or want of exercise, and, added to these, want of communication between the sexes; for a certain state of the ovaria predisposes to it. One symptom in this kind of obstructed menstruation is, there being a mark perceived round the ancle at night where the edge of the shoe came; another is, a fullness and puffiness of the face and eyelids in the morning; so that, after sleep, the whole countenance looks too big; but in the course of the day, this size and appearance goes entirely off. These last effects are evidently those of oedema, because during the day the water lodged in the cellular substance about the face subsides, and the cells below are progressively filled; so that by night the ancles are swelled: during the night again, the gravitation of the fluids diffuses the appearance of swelling over the face.

The upper extremities partake at last in this appearance, becoming swelled about the hands at night. In short, the whole skin is swoln and stretched, and assumes a soft pappy feel. To these symptoms there is now added a very great derangement of stomach, the appetite goes quite away; sometimes the patient has an inclination for improper food, a vehement fondness for cinders, candles, or pipe clay; this does not seem to belong to any sort of instinctive impulse from nature, but depends on a derangement of stomach alone: all these evidences are further proved by flatulency and a sense of weight at the stomach after eating; great irregularity of the intestines, sometimes costive, and at others lax; vegetables undergoing their acid fermentation, and animal matter its putrefaction; both known by eructations, both dependant on the impaired state of the stomach: to these succeed difficult respiration, either on walking or going up stairs; and this does not arise from ordinary weakness where a person could rest, because she was tired; but in chlorosis she stops because she loses her breath: with this there is palpitation at the heart; the pulse is frequent, small, and hard; and there are hysterical symptoms, very often, where the obstruction has been of long continuance. This complaint however is easily cured where it has been of short duration, and the menstruation is not permanently interrupted.

The treatment will depend on the form which all the symptoms take on when combined. Though cases of this obstruction differ from ordinary weakness, yet the treatment we should pursue will be applicable to most cases of weakness. It is right to keep the bowels clear, by an occasional dose of rhubarb; we should then begin the use of bitter medicines, remembering that in proportion as the weakness is greater, the medicine should be weak; for it is an error to suppose that the stronger a medicine of this kind is, the more efficacious it must be. In all cases of weakness, we must consider the lightest bitters as the most proper; at first, a dram of bitter tincture to an ounce and a half of peppermint water; or an ounce of the bitter infusion instead of the tincture. But at the same time we must recollect, that the stomach is still a weakened organ: the powers of digestion must be still weak, consequently digestion will not be so quick, nor will the food be pushed forward from the stomach so soon as it is in health; and the second meal will be ill digested, because the whole of the first has not left the stomach; for these reasons, a gentle purgative must be joined with the food. A good medicine is bitter pills, formed with such materials as will allow the stomach to act on them without much difficulty. Of all medicines, bark is the worst here; it requires a good stomach to digest it; it increases any difficulty of breathing, that may have existed previous to its use. Now and then a gentle emetic will be useful; we may for that purpose give five grains of ipecacuanha every half hour till it operates. After the bitters have impaired the tone of the stomach, this gentle action will restore its strength, and render them as efficacious as before: when the stomach is strong enough, we may begin with steel, the best form of which is called Griffiths's draughts, but it is the most nauseous mixture that ever was made as originally prescribed, and we should therefore prefer some one of the numerous modes in which this medicine has of late years been revised. By these means the weak patient will be raised up to that state which is nearest health; while the plethoric patient is lowered down to the same point. These two patients being now brought to that same point which is most favourable to menstruation, it remains to discover the best means of getting back the secretion. Having brought down the plethoric, and raised the low and weak patient, so that both are on a par, we may now begin with the emmenagogue remedies.

All those medicines called emmenagogues are

stimulating; we must never use strong stimuli where the constitution is yet weak, or we shall only exhaust the system, and where there is a tendency to plethora, we shall produce hœmoptoe: these, then, must not be begun upon till the constitution is amended. Some employ hellebore, which has sometimes certainly evinced its powers, for which reason we may give forty drops of the tincture, though most commonly the menses will return without giving any thing. Madder is recommended from its supposed deobstruent quality. Instances of its wonderful powers are related in Dr. Homes's practice. Now and then electricity has been useful, when the patient all but menstruates. Friction of the lower extremities is good as exercise. Issues have been recommended; dancing, air, and exercise, are the real, the natural, and only effectual remedies. It is merely necessary to determine to the part; we well know that a mother, directly as she takes the child in her arms, feels the draught of the milk come into the breast, even before the child is put to it.

*Profuse Menstruation.*—We now proceed to consider the opposite state to obstructed menstruation, which is profuse menstruation, or menorrhagia; this is where it returns too often, though there may not be too much lost in each time; or, it may be, there is twice the quantity lost at the regular time: in short, in whatever manner the secretion is increased, so as to weaken the constitution, it forms menorrhagia. Whether there be too much or too little tone in the vessels, they may be inactive; allowing their contents to escape as they do in petechial fever, both into the cellular membrane and into the urine.

Profuse menstruation may depend on increased action of the heart and arteries; or on too much food, drink, or stimuli in any shape. And the symptoms which appear in the constitution from such causes will be just those of plethora; stuffing of the chest, heat and thirst, concurring with this profuse menstruation; and the same treatment of the constitution will remove it: this is the simplest sort of menorrhagia, and requires least discussion. We must prohibit the use of animal food, and keep the bowels in a state of purging with Epsom salts. What we want is not a violent purging, but a gentle increased action of the bowels; by this we pall the appetite, which is another object gained; and it does not allow the food to remain so long in the stomach, while part of the circulating fluids is evacuated by the increased secretion we have produced into the intestines. If this treatment be not sufficient, it will be necessary to apply those local remedies prescribed in floodings.

The next state of increased menstruation is, from relaxation of the system. This will sometimes arise from increased action, which we have said will occasionally degenerate into a weakened state; for the effect of great action is the production of great weakness. Where there is a weak pulse, flabbiness of muscles, and all the symptoms of weakness and relaxation of vessels, a very small force of action in the heart will be equal to the forcing of blood through an open vessel. All the strengthening medicines as well as astringents will be necessary here; alum and bitters: and where there is nothing of a vibrating feel in the pulse, steel may be given. But, sometimes, when the profuse discharge depends on relaxation of vessels, steel will increase the discharge; yet, where there is no fever, it is one of the best remedies. Next comes the cold bath, and moderate exercise in a pure air. In regard to steel, it must be given very gradually at first, as in the mineral waters which are so famous. The stomach will frequently not bear it less diluted. It is very beneficial to recommend patients to some mineral spring in the country, even from a secondary desire to get them out of town, where they may get up early, and enjoy the benefit of a country air. The patient goes with hope and expectation of relief; her mind is amused, and her health impaired by drinking the water, though in the water there should be no virtue all.

The next sort of menorrhagia does not depend on general, but local weakness; arising from the woman having borne a great number of children, and the weakened state of the uterus. This effect is sometimes dependant on excessive venery, hence we account for the violent attacks of menorrhagia prostitutes are very subject to. It may arise from blows on the abdomen. This is a more unmanageable case than the others; because the weakness is local, and any strengthening remedies applied constitutionally increase the strength of both parts at the same time; so that there still is the same difference between the system and the uterus in point of tone, because they are both equally raised: injecting cold and astringent solutions into the vagina is the best remedy. Though now and then a case occurs, in which the opposite means succeed, where every cold application has failed, and throwing up tepid water has put a stop to it.

The worst state of relaxed uterine system is, a great local weakness of the uterine vessels, which cannot be acted upon through the medium of the constitution. Since the hemorrhage will be increased by whatever increases the strength of action in the heart and arteries, it would be more an object to lower the constitution; and the best measure is, to leave it altogether, only attempting to stop the hemorrhage by local means. But the cold application, so often recommended, will fail; a piece of ice has been in the vagina a whole day without stopping it. In these cases, the most likely thing to succeed is, to introduce an injection into the uterus itself; to do which, a tube must be carefully passed up into the uterus, like a male catheter. We must withdraw the wire from the tube, and insert the nose of a small syringe into the tube, and press forward a little of the astringent injection; as soon as it produces pain in the back, the pipe must be taken away, because a very little of the solution will be enough; if there be thirty drops in the uterus, it is quite sufficient. In the very worst case that has been known to happen, this method was completely effectual in the cure.

*Dysmenorrhœa*, or *Painful Menstruation.*—Painful menstruation is a complaint in a state of nature unknown; but it happens among those who do not marry at the time of life nature intended; for which there are many reasons in the present day, and among the rest the difficulty of maintaining a large family: consequently women are thrown out of a state of nature, not doing that which nature intended. The patient, when first attacked with this disease, feels hardly any pain, or if she feel pain, it is only very slight in the lower part of the back, which is from the consent of certain nerves with the uterus; but in four or five years, it becomes established pain in the back as violent as grinding pains

in labour. Such a woman will afterwards bear labour very well, and declare that she would rather bear a child than experience the pain of difficult menstruation once a month.

In this manner the pain increases, but the menstruation goes on very imperfectly, for some time; and when at length it becomes more plentiful in quantity, the pain lessens, and the last two days of the secretion is not attended with any pain.

The appearance of the fluid in this disease is not that of menstruation, as it usually occurs. There are coagula of various sizes, and if what is discharged be examined carefully, flakes of coagulable lymph will be perceived. This state arises from interruption of the functions of the uterus. and it is a situation in which the uterus is much less liable to become impregnated; but if it do, the patient may go on to menstruate without any pain to the end of her life, or perhaps with less than she suffered before. This complaint is more frequent in large towns than in the country.

The first object in regard to treatment is to remove the inflammation, for there can be no difficulty in supposing inflammation present at the time the pain is so violent: one strong proof of which is the coagulable lymph being thrown out. The patient for this purpose should leave off animal food entirely, if possible, at least partially; should avoid all liquors, live as simply as she can, and keep the bowels in such a state, that the stools may not be hard. If she be strong and plethoric we may bleed once; but it is a bad principle to bleed young people, as it lays the foundation for a larger quantity of blood being formed than ought to be. Between one period and another, the parts about the pelvis should occasionally be immersed in the tepid bath, and afterwards rubbed, and as soon as the pain comes on should be put in a warm bath: this may even be done the night before. The pulvis Doveri should also be given to assist perspiration, which is always an object in the present case. Pursuing this plan, the habit will be broken, and the patient may go for years without menstruating with pain; but when it returns, the same ground must be gone over again. It is often entirely relieved by marriage; so that it may sometimes be useful to recommend this change of state to the consideration of the parents.

*Fluor Albus.*—Whites. This is another and very common complaint. Most women conclude it leads to disease, and some are much alarmed at its appearance. In procidentia uteri, it arises mechanically; for its cure, which is sometimes very tedious, the cold water bath is the best remedy of any that we know of: cold water may be injected into the vagina, and if this be not sufficient, an astringent may be added. The case is most unmanageable, when arising at the cessation of the menses: here it often precedes disease of the uterus, and should be treated as if we were in expectation of schirrus; recommending a careful abstinence from wine and spirits; animal food to be quite cut off, if the constitution will bear it; together with which, no exercise of any consequence should be allowed. An occasional purge should also be given; the injection and bath being used regularly.

*Procidentia uteri*, or the falling down of the uterus. The uterus is connected laterally to the pelvis, by the broad ligaments; and anteriorly by the round ligaments. When these parts have lost their tone, they allow the uterus to fall through the vagina, so that the menstrual discharge has been frequently seen coming from the lowest part of the tumour, the os uteri. The most frequent causes are, rising too soon after delivery or after abortion. Next to fluor albus, it is the most common female complaint that is met with. There is a dragging feel in the back, and uneasiness about the hips, arising from the dragging at the broad ligaments: there is also a pain in the groin, and the tedium these sensations produce are exceedingly uncomfortable though not amounting to pain. The procident uterus will at last interfere with the stools and urine, and be pushed down at those times, when the woman tells us she feels something like an egg; this gradually increases, till at last it falls altogether out of the body, producing pain, and perhaps ulceration of the os uteri, from the contact of the clothes; and the bladder, from its connection with the uterus, being dragged down, makes an angle with itself, which stops the passage through the urethra. Now while there are these powers acting in bringing it down, there are no muscles to bring it back; and where gravitation leaves it, there disease finds it. The only sure relief for procidentia uteri is from the use of pessaries; the best are of an oval form, flatted on both sides: the outer edge may be left broad and rounded off, as it is in close contact with the soft parts round it; but towards the hole in the middle it may be made thinner, and this will diminish the bulk and weight: these are to be kept of different sizes. The best are of wood; the cork pessaries cannot be kept clean. They were formerly made round; but this is more inconvenient, and obstructs the passage of the urine and fœces; they also used to be made with very large holes, this was dangerous; the os uteri has become strangulated by getting into it; when this has happened, a pair of pliars may be so introduced, as to break down the ring, so as to enable us to get it out. In introducing this instrument, it is anointed as we please, and so passed edgewise; it is to be laid across the pelvis in such a manner as that the largest diameter is from one ischium to that on the opposite side. This disease is curable in early life by a horizontal posture and the use of astringent solutions.

*Dropsy of the Ovarium* is by no means an uncommon disease. Its first symptom is a sense of pressure on the bladder or rectum; it may further affect the nerves and absorbents, producing dependent symptoms. But it is so long before it produces any real illness, that the water has sometimes been drawn off for some months before any other complaints have been felt. From one tumour, forty-nine pints have been drawn off; and in a few days afterwards, from another tumour in the same patient, nine pints more. There is a case mentioned by Bonetus, where 112 pints were drawn off. The fluid in these cases is not serous, but gelatinous and glary; and there has been fat and hair found in these tumours, and even teeth; this will happen where there has been no impregnation. It is a disease which may be borne a long time: in one patient, who had it from the year 1770 till 1798, it was tapped as often as eighty-four times. In the Memoirs of the Royal Academy, a woman is mentioned, who had it from the age of thirty to that of eighty. It always begins on one side, and gradually spreads over the other. As to treatment, none in the way of medicine has been known to have the

least effect upon it. Tapping will not always be quite successful; therefore, the patient should be warned of the probability of there being more cysts than one.

Another complaint to which females are subject has been called dropsy of the uterus; but for many reasons, no such disease can exist, and the expression therefore is incorrect. The cases mentioned of this disease have most probably been hydatids in the uterus. It is however a slight complaint which cures itself. Dr. Clarke mentions a case, where a lady with a tumour of this kind went into a pastry-cook's shop, and sat down in the parlour; the wet, which she felt, increased, till the whole shop was deluged, and very unpleasant conjectures were the consequence. In another case, where the lady was riding in a coach, which driving over the bad pavement, the weak membrane gave way, and the whole fluid escaped. Instead of a single hydatid, there may be some thousands hanging in clusters of all sizes. There will be no symptoms but increase of size with occasional discharges of water; and, when the uterus does contract, nothing will come away but the water and hydatids.

There are several other diseases which appertain to these organs, but which belong rather to the department of surgery than of the obstetric branch, and to that department we shall transfer them. These are enlarged nymphæ, imperforate hymen, diseased labiæ, polypus tumours, schirrous and cancerous uterus.

*Final Cessation of the Menses.*—This is a work of time; a work which proceeds slowly, for nature never acts abruptly: the discharge is first broken after having continued from 15 to 50 years of age. It is necessary indeed that it should be stopped gradually, to prevent the constitution from being destroyed; and it happens that the body is frequently broken by this event; in fact it is one of the most dangerous periods of a woman's life. It not uncommonly happens that the menses at this time become profuse, producing dropsy, and the woman is carried off in this manner. Another evil is, that at this period all glandular complaints which may have lain dormant for many years, now come forward. A little lump in the breast which has hardly been felt for years, will now be converted into a formidable cancer, which will destroy if not removed. Not unfrequently a tumour which has long lain harmlessly on the os uteri will now begin to give pain, enlarge, and be troublesome. The utmost care is necessary in regard to simplicity of diet, and regularity of exercise and rest: and the state of the bowels should be carefully watched. At this period, also, there is a disposition to a general enlargement of several of the sexual organs, which often induce a woman to suppose that instead of finally ceasing to menstruate, she has once more begun to conceive. The uterus appears to swell, the breasts to become full, and there is a sense of motion in the uterus as though a fœtus were in the act of struggling. This affection, for want of a better name, is generally called Spurious Pregnancy. Perhaps we are not exactly acquainted with the cause; but we know what is of far more consequence: and that is that in point of fact there is no pregnancy whatever, and that the symptoms which thus mimic it subside in a few weeks when attacked by a course of gentle cathartics, and free exercise.

### Conception.

It is usual in this part of a treatise on midwifery to examine the different theories which have been offered to the world, on the mysterious subject of conception. The general physiologist, however, has usually contended that such an enquiry is a branch of his department: and strictly speaking we believe the physiologist to be right. On this account we shall transfer the whole which is usually offered upon conception to the article Physiology: under which the reader will find an account of whatever is at present known upon this subject.

We have also given a distinct section under the article Fœtus: to which therefore we refer for a minute account of the fœtus itself, and the contents of the gravid uterus in general, in regard to their structure and anatomy.

### Pregnancy.

Pregnancy produces a great number of changes in the constitution, dependent upon the change which takes place in the uterus, the great centre of sympathy in the female frame. It also produces a variety of complaints which are rather troublesome than severe, and many of which must rather be palliated, than can hope to be cured till the abdomen is relieved of its weight. These are sickness, vomiting, heartburn, costiveness or diarrhœa, suppression of urine, and its consequences, and especially retroverted uterus, from a full bladder pressing upon it before it is much enlarged, varicose veins. Pregnancy is also not unfrequently succeeded by abortion or miscarriage. As we proceed we shall have occasion to refer to a few of these; the rest must be relieved by palliatives and remedies employed as occasion may demand.

Among the first proofs of pregnancy, or of conception, as it is at first called, we may mention a disposition to hysteric fits, and especially in delicate habits a continual tendency to fever; the pulse increased; the palms flushed; and even sometimes a small degree of emaciation: an alteration in the constituent principles of the blood also generally arises, giving the buffy appearance to the blood; and if from any complaint fever ensue, this buff will be greater in quantity than at any other time it would have been; the face will grow thinner, the fat being gradually absorbed. There are also other symptoms of hectic; but the changes in the countenance are most observable. The little fever sometimes occasions a great churlishness of temper; a woman in such circumstances can hardly bear speaking to, and it frequently creates a degree of fretfulness unknown before.

Another sign of pregnancy is, pain and tumefaction in the breast, which is only a part of the uterine system, and is affected from the same cause with the uterus. The aerola becomes darker and broader than before; the rete mucosum is sometimes so altered, that it is as dark as that of a mulatto, while the skin generally is as fair as alabaster. The breasts enlarge, and will not bear the pressure of clothes so well as before; the woman will not be able to lie on one side so well as before: this proceeds from the skin not increasing in proportion to the secretion of the glands.

The next part that sympathizes with the uterus is the stomach: this is generally perceived in the morning; for though occasionally it is affected the whole day, it is generally felt on the first being erect in the morning. The morning sickness in the progress of pregnancy is closely connected with the growth of the child; so much so, that it has sometimes been a rule to judge that where this ceases the child is dead. Pregnant women have antipathies and longings: and this desire is in some for

the most strange things, as is well known to almost every medical practitioner. No woman can be with child if she menstruate; this is the *sine qua non* of pregnancy; for though there may be sometimes an appearance of blood, there is not that regular appearance of uncoagulating fluid which constitutes the menses; even in Hippocrates we may see this. * If in a young woman, between the age of fifteen and thirty-two, the breasts shoot and are very painful, and she is not regular; if the areolæ are enlarged and dark, and she has morning sickness; there is little doubt but that she is with child. It is not likely that all these things should by any accidental cause, be present at the same time, though any of them may arise. There are also peculiar symptoms attending the pregnancy of particular women, as a cough, toothach, headach. Dr. Clarke relates an instance of a person being as completely salivated during a certain period of her pregnancy as ever was a patient in the Lock Hospital. When these symptoms occur, they mark a peculiar idiosyncracy in the constitution, and are the surest possible indications.

The uterus being the great centre of sympathy, the diseases of pregnancy are so many sympathies; and, considered as such, there are no parts which may not become affected by its influence. Not uncommonly there is a continual state of low fever; and yet pregnancy prevents the coming on of many diseases; but though it prevents many, it produces some which are serious.

The most troublesome complaint to which a pregnant woman can be subject is a retroverted uterus. When this disease was first known it was supposed to arise from fright or some other surprise: but this is not true. There are no muscles attached to the uterus, nor is it capable of being influenced by muscular action. The only true cause for this change of position in it is quite mechanical. There is frequently great fulness of the bladder, and if it be very much distended, the retroversion will happen in consequenee. The only period in which it can happen, however, lasts but for four weeks, between the end of the third month and the end of the fourth. For in the early months of pregnancy, the uterus, in length from the fundus to the cervix, is not so great as to fill the space between the sacrum and the neck of the bladder, and cannot for that reason produce suppression, which alone constitutes the disease. This applies to all situations of the uterus in unimpregnated women, and women who are with child till the close of the fourth month of pregnancy; after which, the uterus cannot be made to go down into the pelvis. When the uterus has once fairly mounted into the abdomen it is impossible for it to pass down into the pelvis again.

The retroversio uteri occurs thus: the bladder becomes full, and rises into the cavity of the abdomen; the neck of the bladder in rising draws up the os uteri with it, which drawing up of the os uteri is assisted by the fundus of the bladder pressing down that of the uterus, and, in nineteen cases out of twenty, the bladder in this way becomes the occasional cause of complaint; and when the complaint is formed, the suppression of urine is the only material object to attend to. For the uterus being retroverted, the woman cannot make water; therefore, it must be drawn off by the catheter.

When the water has been once drawn off, it will be necessary to pass the catheter twice a day, till, by the enlarging of the uterus, it rights itself. As it increases in size it will gradually rise; but as it may not be convenient for a medical practitioner to call twice a day for some weeks, it is sometimes advisable to attempt the reducing of it; which is done by the patient placing herself on her hands and knees, and the two fingers of one hand should be passed into the vagina, and a finger of the other into the rectum, by which means it is sometimes possible to succeed. Where the event is left to time, the uterus is sure to recover its proper situation; for which reason it is preferable to leave it.

In attempting to reduce a retroversio uteri, we must recollect always to empty the bladder, and never use force.

*Abortion.*--Miscarriage. At any time after impregnation abortion may take place: it is one of the most common complaints of pregnancy; whence it is matter of no small consequence that ever practitioner should well understand it.

Abortion is not peculiar to the human species, but they are more subject to it than other animals, because they lead more unnatural lives. We see, agreeably to this rule, that the domestic animals more frequently abort than those that are wild. In the human species the greatest number of miscarriages are between the eighth and twelfth week; perhaps there are most at the tenth week than at any other time of pregnancy; but why this should happen at that time more frequently than at any other we are ignorant.

There are two kinds of constitutions very liable to miscarriage; the most strong, and the most weak. The most strong, because there are some causes which act upon the vascular system: the most weak, because many causes act through an irritability of the nervous system. There are also various occasional causes of abortion; and among these we may mention sympathy. This has such an effect with other animals, that there is not a shepherd but knows that if one sheep abort, others will almost always abort too. If a sheep lamb, the shepherd always separates that animal from the flock to prevent the other ewes lambing before their time. One animal is thrown into action, because the other animal is acting. Consents, also, are common in animals as well as sympathies. Certain parts of the body are connected in disease; the nose with the rectum in ascarides, and the shoulder with the liver; crying is known to produce tears in many beholders. These are so many instances of a fact, which proves the impropriety of a pregnant woman being ever in the room with one who has been lately miscarrying. Yet perhaps the true cause of abortion is an indisposition in the uterus to grow after it has reached a certain size; when arrived at that size contractions begin, labour pains succeed, and this, being accompanied with the expulsion of the ovum, constitutes miscarriage; whether this happen at the second, third, fourth, or fifth month, it is still abortion.

The uterus is in some degree of the same nature with the bladder. In different people we know the bladder, without inconvenience, contains a different quantity of urine; in one person it will not, without his feeling uncomfortable, contain more than six ounces; but that is not as much as it can hold, because it will, if necessity urges, contain four times that quantity. In proof that it can dilate, every person may have observed that at one time the quantity which he retains with convenience will vary from that which he retains at another time. It is the same with the uterus, which may be disposed to hold a certain quantity of contents only, by which the ovum attains not more than

a certain size before it excites the involuntary action of the uterus by which the whole is expelled. That the disposition exists, and that this often produces miscarriage appears hence, that many women go to the usual time of miscarriage and feel all the signs of disposition to abort, and yet, if they keep quiet for a sufficient length of time, they will recover, and go the full time of pregnancy. This is accounted for by the disposition in the uterus to contract at a certain period of gestation. Tumours also may cause a disposition to miscarriage; constipation acts in the same way, for, while it lasts, it produces exactly the same effect that other tumours would. All circumstances which, by increasing the circulation, keep up too great a velocity in the motion of the blood. Thus, violent exercise will produce miscarriage; it will, by the increased motions of the blood, separate a portion of the placenta from the uterus, which is very easy to conceive; for a certain force, being applied to the cells of the maternal part of the placenta, will be sufficient to rupture them; and the cells giving way, the blood will make its escape between the surface of the placenta and membranes, so as to form hemorrhage. Where the flow of blood from the ruptured part is considerable, and it finds a different course between the membranes leading to the os uteri, it will produce then a considerable degree of hemorrhage. Violent hemorrhage will also sometimes arise from the use of spirits in too large proportion. Now and then accidental injuries done to other parts of the body will cause a partial separation of the placenta from the uterus. Acute diseases of the mother; pleurisy, acute rheumatism, continued fever, small-pox, scarlatina, may either of them produce miscarriage; there is no disease in which abortion is so dangerous as in the small-pox. Passions of the mind will frequently cause it; and none so surely as those which increase the action of the heart and arteries. Rage may separate the placenta from the uterus very soon. It is not essentially necessary that the force of action of the heart and arteries in general should be increased, because increased local action of the part is quite sufficient; whence, the union of the sexes often causes women to abort; and to make sure of breaking the habit, the best way is, to separate the wife from her husband for a time. Violent exercise of almost any of the passions may produce the same effect.

With regard to the signs of approaching abortion, the first and most obvious change is the absence of the morning sickness, which sickness is always a sign of health in the fetus, and goes away when the fetus dies. Another symptom preceding a miscarriage is, a subsidence of the swelling of the breasts, from being hard they become flaccid; by these signs will any woman, but particularly if she have miscarried before, know the approach of this state. There are also pains about the abdomen and back, which are so many evidences that the uterus has taken on this action. Hemorrhage, in general, also, attends these symptoms, though sometimes a miscarriage may happen with very little loss of blood. Women miscarry in various ways, with regard to the progress of the abortion. In some, the ovum is expelled, and in others it will come away in pieces. The ovum and its membranes may be thrown off first, while the decidua does not appear till afterwards; sometimes the ovum will come away in a clot of blood, and it would not be known as an ovum, if the clot were not broken down and examined: at times the membranes will break very early, and the fetus will come first. In some abortions there is great pain; the grinding pains will sometimes equal those of labour; while in others there is very little, the ovum appearing to drop off from its connexion with the uterus, upon the os uteri being relaxed, just as premature fruit drops from a tree; sometimes the loss of blood is great, at others little.

As to the prognosis in miscarriage, it will be influenced by the state of the constitutton; if it depend upon the contraction of the uterus alone, the pains will go on as in labour, till the whole ovum is expelled. But where the miscarriage depends on some cause acting on the circulation the woman will lose often a large quantity of blood, become cold, faints, and the blood will stop. If during her fainting she be revived by wine and warmth, the hemorrhage will return, and the abortion perhaps be confirmed; but if these stimuli be avoided the blood will often coagulate, close the breach of continuity in the placenta, and the woman will go her full time of pregnancy.

There is very little danger in abortion, generally speaking, when happening in the five first months. We may say, that, provided the constitution be good, there is no danger before the fourth month. The vessels at this time are small, and the hemorrhage is seldom rapid: and the safety or danger of the patient will depend upon the proportional size of the vessels from which the blood issues, together with the time in which it is lost. But if it be continual, though not from large vessels, it may at length kill either immediately, or by overpowering the constitution. A child may be bled to death by leeches, and an infant has been known to die under the operation of a single leech; a woman who does not die while the blood is flowing, may die in consequence of dropsy caused by the loss of blood. Abortion never ends at once in death, but it produces weakness and dropsy. All miscarriages are more dangerous while the woman has an acute disease, and most so with the small-pox; the most dangerous days being from the eleventh to the thirteenth day of the eruption. When hemorrhage happens before abortion, it does not follow that the ovum must be destroyed; enough of the placenta may still remain attached to the uterus to carry on all the purposes of life, and the pregnancy will go on. The constitution, if good, will generally bear the loss of a little blood; as much should be taken as the patient can bear, for twelve ounces at once will be more effectual than sixteen ounces at twice in restoring the balance in the system. After which a saline draught may be given every six hours, with about six drops of laudanum in each; it is rarely useful or necessary to press the opiates beyond that quantity; a large dose of opium will frequently increase the force of action in the heart and arteries, while a small one will keep it in the state desired. The bowels must be kept lax with small doses of the purgative neutral salts; the patient must at the same time be kept quiet, with little or no animal food; farinaceous decoctions with vegetable nutriment is all that should be taken while this state remains, as these do not add to the force of the circulation.

If the abortion, instead of arising from these causes, and being attended with these symptoms, proceed from passions of the mind, or a relaxed state of the os uteri, the plan to be adopted is the use of opium, and the quantity must be considerable: if it is small, it will do nothing; but, if large, the pains in the back and uterus will be relieved, and the abortion quite put by. When a habit of miscarrying is acquired, the woman will

know the period at which it is likely to occur; and, before that time comes on, laudanum should be had recourse to, from ten to fifteen drops, increasing it gradually till the time of danger is passed over.

The next occurrence demanding attention is the hemorrhage: we see clearly that fainting is nature's method of restraining a flow of blood. In faintness we know the small vessels are constricted by the whiteness of the skin; we also know that cold is remarkably effectual in stopping a flow of blood from any part, but especially the uterus: not only cold air, but cold water, and even ice, to the back, belly, and parts themselves; every thing should be taken cold, and concealed if possible; ice creams, juices of fruit, seeds, &c.: all the body should be cold both externally and internally. Considerable benefit is derived from ice being introduced into the vagina, and replaced every two or three hours; this will restrain uterine hemorrhage more frequently than any thing else; and if it do not stop it, the constitution will still be secured from the effects which a more profuse hemorrhage would have incurred, and the patient be preserved from the excessive weakness which would have been the consequence of it. Where there is pain without hemorrhage, there is no necessity for being very anxious; for in that sort of abortion the pains will gradually increase as in labour, and the ovum will be thrown off; after which the pains will gradually go off again, and abortion must take place here before the pains can subside. But it sometimes happens that there is great pain with the loss of blood; and though it may be that nothing good can be done to restrain the hemorrhage directly, yet assistance may be given in emptying the uterus; for after the ovum has separated, sometimes it will not come away: in this case the finger of either hand may be introduced, and some part got away; and if it should not be practicable in that way, it is sometimes possible to get in two fingers, and by this contrivance pass them through the os uteri, and restrain the hemorrhage by compression. Should the ovum not be capable of being brought away whole the membranes should never be broken, unless when, after the fifth month, the child can be felt through them before tearing them, in which case it will be possible to get hold of a part of the fetus, and so get it through and relieve the woman from danger; for though in the early months abortion is not dangerous, the danger increases every day; and when it admits of being treated like premature labour, it always should be, as that treatment ensures absolute safety to the woman; but if the membranes be ruptured in any early abortion, or before twelve weeks, the odds are, that there will be no more pains, for the waters having escaped which formed the bulk of the ovum, nothing but the thin skins remain behind, and these are so small, that they will not stimulate the uterus to act, and yet the vessels will continue to bleed.

Abortion is prevented, in the first place, if by observation and knowledge of the patient's life and knowing her to have been subject to miscarriages we induce her to avoid the same cause which has before produced it. It will next be necessary to take care that this does not occur, even if the former cause is applied, by bleeding and opening the bowels where there is sudden occasion, otherwise by laxatives and occasional bleeding only. If, on the contrary, there is reason to believe that the woman miscarried from weakness, we may prevent a recurrence of it by strengthening her by good diet, and the use of bitters and tonics. There are women who appear to miscarry regularly from the state of the uterus being, as we have already observed, unfavourable to growth beyond a certain extent; in this state abortion is frequently prevented by immersion in the warm bath; it lessens the disposition of the uterus to contract. If there be any reason to suspect great weakness in the uterus and uterine vessels, the application of cold will be of great advantage in giving the proper tone to the vessels. Many women miscarry in consequence of the connexion between the sexes: when this cause exists, the parties should be separated till the period is gone by; for after quickening there is infinitely less risk of its occurrence.

### Labour.

The gestation being completed, labour, or the pain so denominated, is the natural process by which the child is forced into the world.

There is some little variance in the term of gestation of different women; at least the regularity in the human species does not equal that which we behold in other animals. The usual term is forty weeks or nine calendar months; and the period from which the time ought to be dated is a middle point between the antecedent and succeeding times of menstruation. The Roman law allows ten months to legitimate parturition, or, in other words, ten months after the death of the husband: Hippocrates, upon whose opinion this law was probably founded, allowed this term, in like manner, as its utmost stretch, and would not extend it a moment beyond. The old French law (for the present may perhaps vary) was co-extensive. Yet Haller gives instances which it is difficult not to credit of eleven, twelve, and even more than twelve months: whence the law of England is wisely silent upon the subject, and chuses rather to trust to the fair professional opinion and observation of the day, in connexion with collateral circumstances, than rashly and abruptly to ruin a female reputation upon a moot and controverted point.

It is a law of nature, that about this period of time the fetus should be expelled from the womb: and hence, whether living or dead, whether light or bulky, whether the uterus be strong or feeble, the fetus is expelled. A thousand causes have been assigned for expulsion at this rather than at any other period, but not one of them appears to hold. It is a law of nature, and we know nothing beyond.

Labour then is intended to expel the child and its membranes from the uterus; and from the variety of phænomena it presents, it has usually and may conveniently be divided into three classes; natural, difficult, and preternatural. In the first kind the head presents, and the pains progressively increase, and in consequence of such increase, by pressing the head against the orifice of the uterus, gradually enlarge it, by which it becomes protruded into the vagina: the same coercive power being exercised over which the head of the child is shortly afterwards protruded into the world. The whole process is completed within twenty-four hours at the utmost, and is unaccompanied with difficulty or danger.

In the class of difficult labours, the head indeed still presents; but the term is protracted beyond this period from accidental circumstances that render it doubtful whether the life of both the

mother and child can be preserved; or are else accompanied with other accidents, as twin cases, floodings, convulsions, rupture of the uterus.

The class of preternatural labours includes every presentation besides that of the head, or that of the head itself, in conjunction with an upper or lower extremity.

*Natural Labour.*—In this division of labour there are four stages, according to the mode in which its progress is usually contemplated. The first stage is that in which the head of the child enters the pelvis, passing down as far as it can move without changing its position. The second includes the period of the child's head passing through the cavity of the vagina and os externum. The third, the change taken place in the vagina and os externum. The fourth, the delivery of the body of the child, and the expulsion of the placenta. In one of the two first stages the os uteri dilates, and in one of the three first the membranes are ruptured.

In the regular process of natural labour, the head, by the contractions of the uterus, is forced down and passed through the os externum. The uterus, after an interval of rest, again contracts, by which effort the shoulders are expelled. The breech and lower extremities presently follow. During the progress of expulsion the uterus contracts around the remaining parts of the child, and at the time the placenta only remains, the uterus is only sufficiently large to contain it. The next effort of the uterus, heretofore, by contracting its internal surface, not only assists in pressing out the placenta, but becomes the cause of the separation: while the same power, which separates the placenta and throws it off, prevents the occurrence of any serious hemorrhage. This is a most beautiful illustration of the mercy and power, as well as wisdom, of the Almighty.

At the commencement of this process there is almost always a discharge of mucus tinged with blood from the vagina, and the blood is sometimes intermixed in considerable quantity; a fact, however, which is of no consequence. There is at this time also very generally an uneasy oppression about the præcordia; and as the pains increase in violence, vomiting will often arise from the extreme distension of the os uteri, and the pulse generally augment in strength and frequency. At the same time the progressive pressure of the child's head expels almost involuntarily both the urine and feces: while from the vicinity of the sciatic nerve cramp and paralysis occasionally take place from the same cause.

In labours of every kind there are many little things to be attended to, which, though seemingly frivolous, are yet of great importance, and, in general, are only acquired by practice: first, then, the bed should be so made, that the woman may lie comfortably both in labour and after labour, and that she may lie in the best way with regard to our convenience. If she is used to a mattress she may lie on one, it being the best sort of bed; but if she is afraid of a mattress, she may be allowed to lie on a feather bed, first making it as nearly as possible a mattress by beating the feathers all away to the other side of the bed. Upon the feather bed a blanket should be laid and a sheet, and upon these a common red sheep skin, or in stead of it a piece of oil skin or oil cloth; over this a blanket doubled to four thicknesses; and lastly, a sheet upon this four times doubled, only lengthwise; this last sheet is to be laid across, and secured to the bedstead by tapes. When the os uteri is so far dilated, that in the event of the membranes breaking it would receive the apex of the head, the patient should be put to bed, but not before: for, with some women who have had children, it is astonishing how fast the os uteri will dilate itself; it sometimes takes place with such prodigious rapidity, that there is only time to get the woman on the bed before the child is born.

The woman should be undressed before getting into bed: her shift had better be tucked up around her; and, instead of a shift below, a petticoat will do much better, as it saves the linen. When placed on the bed she must lie as near as possible to the edge, and in the posture before described; this is equally proper in the easiest and most difficult labours. The lying-in room should be as airy as possible; and upon this principle it is that the poor people in the country get about sooner after lying-in than the same class of inhabitants of the metropolis: in the generality of cottages it is not necessary to be very anxious about this, there are few of them so air tight but that they will do without a ventilator. If food is proposed during labour, we should generally speak rather against than in favour of it; for if food be taken, it must be either digested or undigested; in either case it is productive of mischief: if digested, it becomes the fuel of fever; if it remain undigested, the stomach and bowels are all the worse for it: the proper refreshment is tea with dry toast, as this will do no harm. The urine should frequently be evacuated, and the perineum be supported with the practitioner's left hand as soon as the child's head rests upon it.

The reason why the perineum needs this support is simply this; a woman bears down with a force equal to three, one of which is voluntary; the natural structure of the perineum has enabled it to support, without danger, the contraction of the uterus; it has therefore, of itself, a power superior to two, which is the force of uterine contraction; but, in consequence of the patient's voluntary efforts being added to the involuntary efforts of the uterus, a force equal to three is acting against a power equal to only two. By pressing against this part, we do not say the head shall not come out; we only say it shall not come through a hole which is too small to receive it. In supporting the perineum, it may be done through the medium of a folded cloth, which is held in the hand upon the perineum, and keeps the hand clean from occasional discharges of meconium or fæces, waters, &c. and the perineum should not be left unsupported, till the shoulders are born; indeed laceration more frequently happens while the shoulders are passing than when the head is. The great art is, to give support close to the edge, against which the greatest force is acting, for the parts give way first at the edge. The perineum is to be supported from the time that it is stretched by the pressure of the head, and we must take care that we apply sufficient force to counteract the voluntary efforts of the patient.

As soon as the child is born, breathes, and cries, we should tie the navel string. To do this, about ten threads must be joined in the ligature; the first made about two inches from the body, and the second the same distance from that again, or towards the placenta. The division is made between the two ligatures, the second being only intended to prevent the blood escaping from the divided cord, and staining the bed. The next step to the separation of the child is the placing

dry clothes under the patient and to the perineum. Midwives apply them warm; this should only be done in winter, for warmth increases the discharge from the uterus. We should then lay the hand on the abdomen, to ascertain whether there is another child in the uterus; being satisfied of that, we are to proceed to the extraction of the placenta.

The uterus contracts after the birth of the child, so as to contain only this substance; and its contractions being continued, the surface naturally must first loosen and then separate itself from that of the placenta; and the same contraction which separates, expels it. It is generally necessary to pass the fingers up upon the cord which is held in the other hand, and if we be able to feel the root of the placenta, the separation is complete, and we have only to get it gently out from the os uteri. If the root of the placenta cannot be felt, it is dangerous to pull the cord with any degree of force; it is still attached to the uterus, and may produce inversion of the womb. When, by gently drawing the cord, we have got the placenta and membranes down to the os externum, we should have a bason ready to slip it under the bed-clothes; and in drawing the placenta out, the cleanest way to bring the membranes with it is to turn it round, by which means, after a few turns, we separate them neatly; after which it will be convenient not only to lay under the patient the end of the folded sheet which hung over the bed-side, but also to make some degree of pressure upon the abdomen by bandage, after which she may be entrusted to the care of the nurse.

*Difficult Labour.*—Of difficult labour there are three species. First, those labours which, though protracted, are ultimately accomplished by the powers of nature unassisted by art. Secondly, those which, although requiring the assistance of art, yet are compatible with the life both of the mother and the child. Thirdly, those which, besides being accomplished by artificial means, require that either the life of the child must give way to save the parent, or of the parent to preserve the child.

The first source of difficulty is weakness: we know that labour requires a certain quantity of force or power, therefore labour is more likely to be difficult in weak than in strong women: we have many proofs to the contrary; but generally speaking it is so.

Fatness is another predisposing cause of difficult labour: fatness offers resistance, and generally occurs in women of weak constitutions; so that here we have both resistance and want of power. All asthmatic and pulmonary complaints generally will cause difficult labour. We know that to assist the contractions of the uterus it is necessary to take and keep a full inspiration; and where the chest is not equal to the task imposed upon it, the labour will be more probably protracted.

Deformity of body, attended with constitutional weakness, will generally produce difficulty in labour; it is most likely that in these cases the pelvis is not formed as it should be, partaking of the state in which most of the other bones are. If a woman be too young, the pelvis will not be perfectly formed; and if too old, the parts will be rigid: the best time for a woman to commence child-bearing is between the age of eighteen and twenty-five. For though a woman may be in perfect health at thirty-six, yet we know that the parts were designed to be used at eighteen; and have been inactive for the rest of the time, and cannot then be so fit to act.

The next kind of difficulty in regard to labour is debility of the uterus, not disposing it to contract: this may happen in a woman otherwise strong, as a man may have a weak arm, while the rest of his body may be strong. Such a woman may have no character of weakness about her but this, so that we may not be able very readily to guess at the cause when it exists. It is not proper to give stimulants and opiates here to provoke contraction of the uterus; when stimuli are given, it is not recollected that they produce fever. Opiates are not quite so exceptionable; they save time to the practitioner, but in their effects we cannot govern them, else they occasionlly save the woman's strength.

Another cause of difficult labour is the irregular contraction of the fibres of the uterus; where the longitudinal set and the circular set do not contract as they should do relatively to each other. This always arises from irritation of the os uteri, in needless examinations. The patient has strong labour pains without the delivery being forwarded. We may here recommend a dose of opium; after which it is probable that upon their action recommencing, it will be in the natural manner.

Passions of the mind are the next set of causes of difficult labour: the effect of them is to diminish the strength and frequency of the pains, till they at last subside altogether; and this will all occur in constitutions where the powers of action were originally very good. These things shew the necessity of keeping up the hopes of the patient to the pitch of security and confidence for from the moment that her confidence fails her, from that moment the pains are protracted, and that merely from the state of doubt and arising anxiety. This points out the necessity of never forming a prognosis of duration; we may form and declare our opinion as to the event, but never the length of time which the labour shall last; for if we were to speak the truth, our prognosis would be in general very unsatisfactory. If we only tell a patient it will be to-morrow before the child is born, it will depress her resolution, and damp her perseverance; the pains will diminish, and she will be all the worse for what has been said.

The os uteri may also become a cause of difficult labour by its being rigid. This state is natural to some women, and especially those who are somewhat advanced in life when they begin to bear; also with the first child the parts dilate more slowly than in subsequent labours. Rigidity may arise from repeated and useless examinations, and where the os uteri is rigid, it forms one of the most painful labours, accompanied with excruciating pains in the back. This state is attended with inclination to vomit and to sleep, both which things are in themselves useful; for sleep restores the strength of the body, while the vomiting strengthens the bearing down.

The os uteri when in this rigid state resembles inflammation in being tender to the touch; its hardness almost reminds us of a board, which is bored through the middle with an augur. This is one of two kinds of rigid os uteri; the other description of which gives a very different feel: it is more apt to give way under the finger, is of a pulpy substance, and in some measure resembles the intestine of an animal filled with water and drawn into a circle; and though this is not so rigid to the finger as the other, yet it is longer in giving way. This sort of swelling or thicken-

ing is sometimes occasioned by œdema, or ecchymosis, as it has been known to arise in a quarter of an hour; at the same time it lies between the os pubis and the child's head. It generally happens that from the pain there is a degree of fever present. But when once one part of the enlarged circle retires behind the head, the whole of it slips up, and the child is sometimes born in five minutes, if there is no resistance from the soft parts.

We must here be very cautious not to allow the woman to exhaust herself in fruitless efforts; for which reason we should explain to her that it will be of no avail that the mouth of the womb is not large enough to admit of the child's passing, and that it must be a work of time, and will be a work of time, notwithstanding all the endeavours she may make to shorten it. We should in the meanwhile fill up our time and keep up her attention by ordering an injection, or making some other preparation; and if the last be a six or eight ounce mixture, in case the os uteri is very irritable, and by frequent examination has been rendered more so by being deprived of its mucus, twenty drops of laudanum may be added to the mixture.

In difficult labours it will now and then happen that the vagina is very rigid, making considerable resistance; this very generally depends on irritation, by the interference of the midwife. The consequence is that inflammation of the periosteum and membranes covering the bones very often arises. In such cases patience and horizontal posture are both grand remedies; besides which, why not use fomentations, as in whitlow, or any other case, where relaxation is wanted.

The next cause that impedes labour, from resistance of the soft parts, is a full bladder and suppression of urine; this is not a formidable evil. In early examination we shall, instead of feeling the mouth of the uterus, come to the neck of the distended bladder; but in the progress of labour the child's head presses upon the neck of the bladder, which pressure causes the suppression. This will never happen if the bladder be frequently employed in the early part of labour, because the time between the head's being at the upper aperture of the pelvis and delivery is in general of a moderate duration, in which no serious accumulation can take place in the bladder, unless the labour is very long. When it is necessary to draw off the urine, the catheter will enter the meatus urinarius with greater ease if its curve be a little increased: with regard to a woman in this situation, we should never rest satisfied that her bladder is not dangerously full, because we see a little water which has passed without the instrument. We must never allow the woman's delicacy or dislike to prevent our examining: we must represent to her the importance of it; for if she die from a burst bladder, it will be a very deplorable circumstance, as it is so easily prevented.

Contraction of the vagina forms another impediment to labour. If this be the consequence of a cicatrix it will sometimes be proper to divide it by a knife, in order to allow the child's head to pass; though when we attempt to divide it high up, we are in a very delicate situation on account of the bladder and rectum; and if the head have passed so far forward as to come into view, it will be adviseable to leave it to nature. Excrescences arising from the os uteri or vagina may impede labour, though these causes in general only produce slight difficulty: the os uteri has been known to be in such a state from a tumour on its side, that only two thirds of the circle have dilated for the passage of the child's head. In most cases the tumour is pushed aside, so that it occupies a protected situation during labour, and the head passes very well.

An unfavourable state of the ovum may protract labour. It is stated that the navel-string may be tied round the neck of the child in its passage through, by which the effect of each pain is lost; being held on each side by the string, it is forced a little forward in each pain, retiring again as soon as the pain goes off. It does not appear likely however that this ever happens, because the effect attributed to the elasticity of the cord may be seen in every labour from the elasticity of the soft parts, and more particularly where the head is larger than the cavity of the pelvis. So that there is no reason to believe this to be a cause of difficult labour. Yet we may now speak of its treatment, when it does occur. The cord is frequently turned round the neck of the child when the circulation is not in the least interrupted; in this case we have only to turn it off the neck, and if the circulation be felt, leave it. Where the loop round the neck is tight so as to interrupt the pulse, we may loosen it by passing the finger between it and the skin of the neck, so as to feel the pulse again. It has been said to be sometimes so tight as not to admit of its being slackened at all; this is just possible, and the most improbable thing in the world. It is then to be divided between two ligatures.

Rigidity of the membranes has been stated to produce difficult labour. It has been observed labour was quicker when the membranes were ruptured early; but though the labour is slower, it is safer where the membranes are unruptured. Where the membranes are to be opened, there have been a great number of pretty-looking instruments invented for doing it. Long tubes, at the end of which blades or points were projected. But it requires more skill in telling where they should be let alone, than were they should be meddled with. With the first child they must never be broken; the inferior parts of the passage dilate but slowly, and require the assistance which the membranes are capable of giving. But in subsequent labours perhaps it may be admissible, where the pelvis and soft parts are known to be capacious and yielding. The time when they should be broken is when the head may be received into the os uteri upon their breaking. Never must they be broken before the os uteri is of the proper size; if they be we cause a continual drivelling of the waters, which in itself is productive of great delay. It will often protract the labour two days: it has been known to protract it three weeks.

A frequent cause of the rupture of the membranes is the using too violent exercise for the parts to bear. The riding in a coach over the rough stones will bring it on, as the weaker part will always give way first; another cause of the membranes giving way may be the death of the child, for dead members will give way when a living member will not give way.

The next cause of difficult labour is in the disproportionate size of the child's head, compared with the cavity of the pelvis. This is not mollities ossium; but a disease which, independent of that, is capable of producing considerable difficulty. The different size of the head will regu-

late the progress of the labour. The head may be so large as not to pass, and this increased size of head may be combined with a state of pelvis which in shape resembles a man's; which pelvis would not admit a head of an ordinary size. The head may also be accidentally larger than it should be, for two heads of the same absolute size shall in labour prove to be of different sizes: that is, the first shall give way and allow of compression by the soft parts; while the second, by being more perfectly ossified, will not allow the bones to slip one over the other, as in the first instance; for which reason one of these two heads will in effect be larger than the other: the volume of the head may be also increased by a descent of one or both the hands; or it may occupy undue space by a wrong position. In all these cases instead of trusting to time, or using instruments, we may generally afford relief by introducing the fingers and turning the head right. Independently of these difficulties there are others of a totally different class, and which produce difficulty chiefly by rendering a labour more complex. The first which we shall notice is the presentation of the umbilical funis.

We have already explained that the fœtal life is that of a fish; that it is furnished with an apparatus resembling gills; that the funis is analogous to the pulmonary artery and vein; and that the circulation through it, if stopped, produces death upon the same principle that suffocation does to an animal which breathes. Hence the importance of the funis presenting. Let what part will present, arms, legs, shoulders, or breech, it is of consequence from this circumstance chiefly. It is of no consequence in regard to the woman's safety, and all treatment is applicable merely upon the simple ground of preserving the child's life while labour goes forward. From whatever cause the funis has presented, the effect is the same, and the treatment must be directed by the circumstances of the case. Suppose the membranes lately broken, and the os uteri pretty fully dilated; the funis being down. The best practice here will be to turn the child, and bring down the feet; as this affords the best chance for saving the child's life: though where this happens with the first child, it is as well to let it remain, for the operation of turning will then of itself produce the death of the child. Suppose the head in the pelvis, and the navel-string pulsating in the vagina; the best way is to return it, and follow it up with a long strip of cloth, or handkerchief, artfully pushed up, so as effectually to prevent its coming down again. And as this is the only chance that we have of keeping it above the pelvis, this should never be left undone; and at last the head will get so far down, that it can be delivered by the forceps immediately. In all cases we should recollect that the woman's safety never must be hazarded by doing that which will only obtain a precarious chance for saving the life of the child.

*Plurality of Children.*—The disposition to multiply is general throughout the whole creation; even in vegetables it is not unusual to see two kernels in one nut; and the sheep, instead of having one lamb, will sometimes bring two. All uniparous animals may have two young ones, though in some species it is more frequent than in others; it is not so common for a mare to have two foals, as for the ewe to have two lambs. In the human subject twins occur once in about forty-eight labours: this calculation is taken from the lying-in hospitals of London, Edinburgh, and Dublin. There are sometimes more than two; as three, four, and five; but such instances are extremely rare. Dr. Osborn mentions a case where in an early miscarriage he saw six distinct ova, each complete; and there is a monument in Holland to a woman, who, the inscription declares, had 365 children. But it signifies not whether there is one or 365 in the uterus, for each has still its distinct bag of membranes, each its own placenta; though sometimes the placenta are joined so closely, that they would almost seem one cake.

There is no mark by which we can distinguish twins till after the birth of one child. It has been said that labour is then more slow than at other times; but this would imply that single labours were never slow, which happens to be very far from true. Another opinion is that the woman is bigger than in other labours, and this would seem to be very natural; but it certainly is not very true, but very much the contrary; and many practitioners have declared that they have never once been right in their opinion upon this subject. So that the difficulty of the labour at first will depend on itself, without any reference to the child. But after one child is born, we can easily lay our hand upon the abdomen, and determine the point; not forgetting that where there are more than one child, the placenta must never be brought down till the last child is delivered; for if we use any force so as to detach a part of the placenta from the uterus we produce a flooding. If the abdomen be examined before delivery, we shall feel the tumour reaching high up to the scrobiculus cordis; if after delivery, we shall perceive a rounded tumour lying on one side above the pelvis like a football. If we examine the abdomen in a twin case, after one child is delivered we shall not be able to say, from the diminished size of the tumour, that one child has come away.

When we have ascertained that a second child remains in the uterus, we should wait quietly, and without communicating the fact to the patient herself lest we alarm her, till by a recurrence of the pain, we find the part that presents; and if it be an arm or shoulder, we should tuck up the sleeve of our shirt, and pass up the hand greased into the uterus, without any preparation on the part of the woman; it is here better avoided, and the child may be turned at once. The one child has already passed, therefore the contractions of the uterus and vagina will be a smaller impediment here than in any other case. Before we thus act, however, it will be better to leave the patient to recruit herself awhile. If the practitioner be a young man, it is best to wait about four hours, before he does any thing towards the delivering the second child; an experienced person probably need not wait so long. If we wait four hours, no harm can happen from hastening the delivery; we have waited so long as to justify ourselves in the eyes of all the world.

A twin case is not quite so safe as a single birth; for the woman will sometimes die without our being able to give the least reason for it. As there have been some fatal instances, we should be upon our guard not to say there is no danger in such a case; we may say they are commonly not cases of danger, but should not, when asked, affirm that it is perfectly safe.

*Convulsions.*—Cases of puerperal convulsion bear a strong analogy to epileptic fits: so much so, that it is nearly impossible to distinguish them at first sight, excepting from the different degree of violence attending each: the fit of puerperal convulsions

being much more violent than any fit of epilepsy. The paroxysm is so violent indeed, that a woman, who, when in health, was by no means strong, has shaken the whole room with her exertions.

Puerperal convulsions may occasionally arise at any time between the sixth month and the completion of labour; they seldom or never happen before the sixth month. They may arise as the first symptom of labour, in the course of labour, or after the labour is in other respects finished. Puerperal convulsions have these characters belonging to them; they always occur in paroxysms, and those paroxysms occur periodically like labour pains; so that there is a considerable space, perhaps two hours, between the two first attacks: after this, they become more frequent. They not only occur with the labour pains, but in the intervals; and whether there have been labour pains or not, before they come on we shall always find the os uteri dilated, and it is sure to become dilated from the continuance of these convulsions; and at length, if the woman be not relieved and the convulsions continue without killing her, the child is actually expelled, without any labour pains at all. On opening such cases after death, where the convulsions have been violent, the child has been found partly expelled from the contraction of the uterus; which power is capable of expelling it even after death. In one case in which it happened, the whole child was expelled except the head.

It is a disease depending on the uterus, and brought on by the labour pains; or if arising before them, is of itself capable of expelling the child, if the woman survive long enough. It occurs in all presentations: sometimes with the first child, and sometimes with those born afterwards. It resembles hysteria, as well as epilepsy; but is more violent than either. No force can restrain a woman when in these convulsions, be the same woman naturally ever so weak. The distortion of the countenance again is beyond any thing that can be conceived; in regard to deformity, surpassing any thing the imagination of the most extravagant painter ever furnished: nothing bears any resemblance to the progress of this disease; the rapidity with which the eyes open and shut, the sudden twirlings of the mouth, are altogether frightful, dreadful, and inconceivable.

These convulsions are by no means external only; respiration is first affected with a hissing, and catching. The patient stretches herself out, and immediately the convulsion begins. The next symptom which arises comes on after the convulsive motions have continued in their utmost violence for a time; the woman foams at the mouth, and snores like an apoplectic patient, indicating great fulness about the brain. These symptoms are succeeded by a comatose sleep, out of which she awakes astonished, on being told what has happened, not in the least aware that she has been in a fit; and then she will fall into another fit, out of which she will again recover as before. It rarely happens that the understanding is taken away in this disease, until it has been repeated several times. In the fit the skin becomes dark and purple, proving that the circulation through the lungs is not free, which purple colour leaves the woman gradually after the fit is gone; and it is not only the external parts of the muscles of respiration that are affected here, but the uterus also. This is known by introducing the hand when the convulsions come on; the uterus will contract, but with a tremulous undetermined sort of force, perfectly different from what it does at any other time.

There are two cases of puerperal convulsions which are very distinct: one is a convulsion dependant on some organic affection of the brain; the other, on an irritable state of the nervous system. Where puerperal convulsion arises from the former, but more especially from fulness of vessels or extravasation, it is always preceded by some symptoms, which, if watched, will enable us to relieve, if the patient sends in time, which, however, is rarely done.

In a patient strongly disposed to this complaint, there will be a sense of great fulness in the region of the brain, which amounts even to pressure, giddiness in the latter periods of pregnancy, dizziness in the head, and a sensation of weight when the head stoops forward, which gives her the idea that she shall not be able to raise it again; imperfect vision; bodies dancing before the eyes, sometimes dark, at others luminous. This state of the eyes denotes fulness of the vessels of the head more surely than any other symptom, and if allowed to continue will lead to extravasation and puerperal convulsions. The disturbed vision is a very strong symptom, and must never be passed over. If attended to early, even though symptoms of the complaint are present, still it may, by timely assiduity on our part, be prevented from ending in premature labour. Here repeated bleedings and purgatives are all in all; the sole object being to take off stimuli. After bleeding, and before any aperient is given by the mouth, we should give a solution of soft soap in warm water as an injection; it is the quickest as well as the surest means; then a purgative mixture, with manna and Epsom salts. By these means, that is, by bleeding, purging, and the abstinence of all solid food and wine, no more blood is made, what the patient has is diminished, and she gets gradually better.

When convulsion arises from a general irritable state of nerves, it is difficult to distinguish the disease before it becomes established. It is most frequent in large towns, and in those women who lead the most indolent life; hence it is found in the first circles of fashion, in preference to the others; and there is one grand circumstance which has great influence in its production, that is, a woman's being with child when she should not. Being obliged to live in a state of seclusion from society for some months perhaps, she reflects and broods over every thing which relates to her situation, and which gives her pain: she recollects she is not to enjoy the society of the babe she has borne, but on the contrary will be obliged perhaps to part with it for ever: she is afraid of her situation being known, and that she shall be considered an outcast to society. In this way she will brood in solitude, till at last the mere irritation of labour may be sufficient to excite puerperal convulsions. The difference between this kind of puerperal convulsions and the other does not probably exist in any thing visible: it is not possible to tell the difference exactly; but just as it is coming on, the woman will complain suddenly of a violent pain in her head, or the stomach, which is expressed in the same way by all women; they all say they cannot survive the pain if it return. The mode of treatment will not essentially vary from that already mentioned. Our plan however should be less active, and opiates may be allowed to succeed it.

These observations relate to convulsions antecedently to labour. We now proceed to the same disease during labour.

It has sometimes happened, that a woman has died of the first convulsion; but it happens much

more frequently that a number come on in succession, arising either before or after delivery. The patient very rarely dies in the fit, though she die from the convulsion; she dies in the comatose state which succeeds to the fit; and if we be suddenly called to a patient in this state, where we are unable to learn the circumstances of the case, and we evidently see there is great fulness about the head, we should immediately open a vein, and draw blood largely, being regulated by the appearance of the body and what we are able to learn from those around. From twelve to twenty ounces may be the extent of the first bleeding; if the disease go on, and the os uteri do not admit of delivery from its not being in the least dilated, the convulsions not gone off, and the pulse in such a state as admits of it, we should bleed again, and again. Some practitioners have with the greatest advantage taken sixty ounces of blood in a day. A woman in this state will admit of divided bleedings very largely. This takes off the pressure from the brain, made by the blood while in its vessels; and also the chance of its being extravasated. This must be done immediately: then the head must be shaved, and a large blister applied over the whole cranium. The next means of relieving is getting the bowels into action as quickly as possible; first, by throwing up a soft soap solution in the form of injection, and then by giving a concentrated solution of some neutral salt with infusion of senna.

If it be a case of convulsions depending on irritation, we may certainly do something more by the use of opiates; and here we must be limited in the quantity of blood which may be taken away. The proportion must be small compared with that proper in plethora. Eight or ten ounces will be a full bleeding; and if it be necessary to take more, we may apply leeches to the temples, never neglecting the bowels, which must be kept very open. It has been directed that the patient be put into a warm bath; but experience contradicts its use; the fits have been found to be more violent in it, and the patient is liable to bruise herself in it, and be otherwise much injured.

It is an extremely dangerous disease: it is impossible for her brain to bear the violent pressure of her situation; opium, in cases of irritation, is proper, and should be given to the greatest possible extent. With this we may join the affusion of cold water. This, when resolved on, must not be done by sprinkling a little out of a bason upon the patient's face; but we must have both a full and an empty pail, the patient's head being brought over the side of the bed; and before the fit has come on, we may, as in other convulsions, detect its approach by attending to the intercostal muscles, the vibrations of which will warn us that no time is to be lost; when we should immediately discharge the whole over the head at once. Whenever this complaint occurs at or near the time of labour, it is uniformly right to deliver: to dilate the os uteri, and deliver immediately. We should deliver in all cases where it is practicable; for this is the only cure for puerperal convulsions.

If convulsions occur some days after labour, it should be treated as the same disease in other cases.

*Rupture of the Uterus.*—This was formerly considered as a very rare occurrence, though it probably happened oftener than practitioners were aware of. We have many descriptions of sudden deaths in labour, the symptoms of which exactly correspond with those known to attend ruptured uterus. It may be divided into two kinds, spontaneous and accidental: the first happening most commonly in the cervix uteri, and the last in any part of the uterus.

Spontaneous rupture occurs suddenly and unexpectedly, and always without any warning, and for this reason, that it depends on the irregular action of the muscular fibres; and all muscular contraction is immediate. It most commonly happens, that when the head of the child is in the cervix uteri, the lower segment of the uterus is received into the upper aperture of the pelvis, and the aperture of the pelvis without the uterus is opposite to the bones of the head within the uterus; the consequence is, that the uterus is pressed firmly between the two forces: from the pressure being applied in this situation, the longitudinal fibres can only contract from the pressed circle towards the fundus; and upon this principle it will not tear at the extremity, but will tear from the part so pressed upon; the rent once made, may run in any direction.

Accidental rupture occurs from the action of the uterus being violent while the hand of the practitioner is within, or the same thing may happen from pressure of the knee, or some other of the child, which last is frequently the cause.

The manner in which the uterus gives way in this instance, is exactly a fibre contracting over a pulley, which being a disadvantageous position, is liable to be ruptured if the contraction is strong. Certain symptoms take place which are evidences of its having happened; one is a sensation of a sudden and most excruciating pain, which always comes on at the moment of the rupture. A lady, when in labour, was attended by a most respectable practitioner, and a man in years; this case is an example of the manner in which it may come on. The labour went on perfectly well, and it being late at night, he proposed that the husband should go to bed, as his wife would be delivered in three or four hours more. The gentleman then sat down by the bedside of his patient, and in about three quarters of an hour she began to scream suddenly; he supposed the head was in the vagina, as the labour had gone on so well, when to his astonishment he found the head was not to be felt, it had entirely receded. She would get up, and he in vain prayed and begged her to lie still. This state of pain and restlessness was succeeded by faintness from two causes, hemorrhage, and pain. These are attended with another, which is the sudden loss of labour pains. There is a faint inclination in the uterus to keep them up, but they are sure to sink. The organ is destroyed, and its functions must necessarily be destroyed too. There is great restlessness, accompanied with a sense of pain, different from that lately felt: there will be faintness, but without loss of blood externally, for it generally passes into the abdomen; there will be vomiting of a tenacious chocolate coloured fluid; the head or other presenting part recedes usually, and the child can be no longer felt.

All these symptoms combined, become a proof of ruptured uterus; but any one of the symptoms may occur alone; the patient may be in violent pain without rupturing the uterus; she may faint, but it does not follow that her uterus is torn: there must be all these things in common; excruciating pain, a fainting, sickness, and vomiting of that singular kind, and the retiring of the presenting part; these in the aggregate will determine our opinion. If in a case of this kind we find the head has only entered the upper aperture of the pelvis, we cannot get the forceps applied: here it has been said we might turn and bring down the feet: but

this should never be attempted; it only occasions more mischief; the only chance is to open the head of the child. If, however, from the head being high up, and loose, we think that we can embrace it with the forceps, we may try, for we by this mean give another chance for the delivery of a living child, which is a great object at all times.

Suppose a case where the child has actually retired from the cavity of the uterus into the cavity of the abdomen, what is to be done? there have been different opinions; some say it is best to bring the child back, while others leave it to nature. It should always be returned and delivered by the feet. The chance is something in favour of the mother, whose case cannot be worse, and largely in favour of the child.

*Uterine Hemorrhage.*—Flooding cases belong naturally to this section, hemorrhage being one of the constant attendants on the last mentioned accident. We have already considered the history and management of trifling floodings occurring in the six first months of pregnancy, when speaking of the management of abortion: what we are now going to treat of, relates to the three last months: the commencement of labour; during the progress of labour; or after the delivery of the child, and before that of the placenta; and each of these divisions, as regards time, will run into the rest.

The proximate cause of puerperal floodings is in all cases the same thing, consisting of a partial separation of the surface of the placenta from that of the uterus. The difference existing in structure, between the human placenta and that of brutes, accounts for it happening less frequently in them than in us. In quadrupeds the fœtal part separates from the maternal portion, as was before explained; while in us the whole placenta comes away entire, leaving vessels with open mouths; so that when any portion of the placenta is separated by any mischance, a consequent hemorrhage attends, which is proportioned in violence and duration to the extent of the part so exposed. The vessels are largest towards the middle of the placenta; and some of them are very large indeed on the inner surface of the uterus.

The occasional causes of uterine hemorrhage may be any circumstance capable of separating a portion of the placenta from the inside of the uterus. These were enumerated when speaking of abortion: all acute diseases; passions of the mind, as rage, &c. strong liquors in large quantities; and besides these, if the placenta be attached close to or over the os uteri, it will be very likely to produce hemorrhage, either before or in labour. When it is attached on the cervix uteri, it must in the course of the labour be separated by the dilatation of the uterus at its neck; this is so plain, that it cannot require illustration. Such a situated placenta will almost ensure uterine hemorrhage in the last months of pregnancy, which may be more or less in quantity.

If it be very slight, the necessary means to restrain it need be nothing more than what is used in slight hemorrhage from any other part; but when violent, and the patient either gets one gush of blood, or it comes in quantity till she faints, and then it is restrained, and she gradually recovers; and then it recurs from her taking some stimulus into her system, either food, or drink; she has no sooner recovered a little strength, than another bleeding comes on, and she will faint and recover, and the flooding again recur, and so on; the faintness causing the restriction of the vessels; the restriction of the vessels allowing the circulation time to restore its own equilibrium: and when once that has arisen, the force of the circulating blood again overcomes the slight resistance formed by the contraction of the vessels and the formation of the coagulum.

When once a woman has had an uterine hemorrhage, from whatever it has proceeded, she is never safe; and must remain in jeopardy every hour, until she is delivered; for the slightest circumstance may reproduce it after it has once happened. The danger in this state is not from the quantity of blood lost, so much as the manner. A bleeding has come on at the third month, which was exceedingly large in quantity, but in consequence of its not flowing very quick, the woman has survived. Miscarriages occur in which a large quantity of blood is frequently lost, without the woman dying; insomuch that where abortion takes place in the tenth week, she very rarely dies from loss of blood, though sometimes this is excessive. What then does this depend upon? the time in which it is lost, and the way in which it comes on; for although lost from the constitution, it is from small vessels. But when there is a sudden gush of blood from large vessels, the case is quite different. From experience we know that large vessels do not contract so soon as small ones; there is not time for faintness to intervene, and the patient consequently dies immediately.

One symptom of the greatest danger in a flooding case is a want of labour pains, when it occurs in labour; which is the reason that the midwife hardly ever sends for us till it is too late; she thinks nothing can be necessary to be done till the pains go on as they should do, while in fact their subsiding is one of the worst symptoms. It shows that the uterus has not energy enough left to expel the child; so that we always judge uterine hemorrhage to be worse when not attended with pain than when it is. Another bad symptom is, when the os uteri feels relaxed, and flabby like a piece of dead meat, with a hole through the middle of it. It resembles an inanimate opening; we may without resistance move its lips in any direction. When the hemorrhage continues long, the face loses its colour, the mouth and lips become quite pale, and the little projection at the inner canthus of the eye is a very significant part with an attentive observer; it is not often attended to, but if it be sunk, it is a symptom of decided danger: these are followed by want of rest; the patient will be moving about in bed, and that notwithstanding all that we can say, if we even represent the risk of her producing her own death by it, still she will be throwing her arms in every direction, and rolling backwards and forwards in the bed. In this way then will she proceed, one fainting fit succeeding another, at last so rapidly, that it can scarcely be conceived until seen: fits of vomiting towards the end will occur, together with a sort of convulsive raising and lowering of the pomum adami, and life will at last leave her suddenly; perhaps after she has been speaking she will lay her head down and die.

The next danger is, that she may drain to death, by a slow progressive state of the complaint. To-day she shall lose a pint of blood, to-morrow half a pint, next day none, the day after that again a quart, and so on, till the powers of life are exhausted. Thus is she drained to death; for the stomach is not capable of supplying nourishment quick enough to counteract so rapid a consumption.

There are still other dangers arising from uterine

hemorrhage, the consequence of which we have great reason to fear. Suppose a woman in labour loses two quarts of blood by the vessels of the uterus, that woman will, about the fourth day, have a perfect fever in all its characters, somewhat resembling the milk fever, the pulse 120, the countenance flushed, the skin hot and parched, though we should naturally enough expect that instead of producing fever, the loss of two quarts of blood might more readily be expected to take fever off where it existed before. Supposing even that the patient gets quite clear from any return of the hemorrhage, the fear that remains is, whether she have not already too much for the constitution to repair; and we must again wait in expectation of the fever: if that do not come on, so much the better; that is another danger got over. But she may die at the end of twelve months, and that from the effects of a single attack of this complaint. This will in most instances happen in women who are of a flabby loose texture, and have a heavy fat body. Hydrothorax, or ascites, will in these persons supervene at a great distance of time, entirely from the debilitating effects the loss of so large a quantity of blood has induced.

With regard to the powers by which hemorrhage is naturally restrained in different parts of the body, we may say that they are two in number; one of which is the contraction of the blood vessels themselves, the other is the coagulation of the blood in the mouths of the vessels which are ruptured. With regard to the contraction of blood vessels, it is well known that an hemorrhage is frequently stopped by that power alone. If we prick our finger, or shave a bit off, it would bleed everlastingly, were it not for the contraction of the divided branches which stops it, and that so effectually, that if from time to time we even wipe away the blood with a sponge to prevent any assistance which might arise from the formation of coagulum, yet the bleeding will stop. But as the vessels contract gradually and slowly, the blood which forms on the surface being exposed to the air coagulates, and becomes the second cause of the blood ceasing to flow from the divided vessels. So that hemorrhage, considered in general, may be said to be restrained partly by the contraction of vessels, and partly by the coagulation of blood in the vessels. The natural powers by which hemorrhage is usually restrained are the coagulation of the blood as it flows, and the contraction of the vessels. To these a third power is added in the uterus: it is the contraction of the organ itself, and it is not only one of the three, but the most important, as being the most effectual power of them all, in stopping the hemorrhages which flow from the internal surface of the uterus. It should appear also from the experiments of Hewson, that the coagulation of the blood is more rapid in animals when dying, than at any other period; hence he argues that coagulation is always in proportion to necessity.

With regard to *treatment* we may observe that in slight cases, where the quantity of blood lost is very trifling, it will not be necessary to notice the existing state of pregnancy, but to make use of the common remedies for the checking of slight hemorrhage from any internal part. But if there be increased action of the heart and arteries, and we know the constitution will bear it, we may take away ten ounces of blood, and suppress the animal food; moderating the sanguiferous action, so that there shall be no risk of displacing the newly formed coagulum, in its recent state, a tender jelly. If these things are attended to, the blood will perfectly cork up the bleeding orifices of the ruptured vessels. We should at the same time empty the bowels, prohibit all stimulating aliment, and advise a horizontal position. All this however refers to slight cases and an early period; if after this period, or during labour, we must seldom be beguiled from more active measures. The only solid security is a delivery of the child, for which in all cases of profuse or continued hemorrhage we should immediately prepare; and in the process to be pursued we are of course to turn the child.

Wherever in doing this the os uteri very easily gives way, it is the very essence of danger, proving the want of contraction in the uterus. In the present instance, however, we do not want to empty the uterus so much as we wish for its contraction; for if we get away its contents at a time when it cannot or will not contract, we do no good. If the placenta seal up the os uteri, we must go directly through: we may easily indeed screw our hand through it, for it is a loose pulpy mass easily torn. We should not wait long, nor be afraid, and if the labour be recent, we may turn the head and bring down the feet; if the head be low enough to apply the forceps, we may deliver in this manner. The whole of this practice lies in a very small compass; in determining to deliver early, and in determining that our patient shall not die: and it is founded on the principle that hemorrhage from the uterus cannot be restrained by the two powers which are sufficient for stopping a flow of blood in most other parts of the body; by the contraction of the vessels, and the coagulation of the blood in them: and that nature has here appointed a third power, by the presence of which, the human uterus differs from that of all other animals. It is right, however, after turning and bringing down the feet, to allow the child to remain undelivered for a short time, attending to the least pain that may be felt, and gently assisting in the forwarding the expulsion; and when the child is born, to wait the action of the uterus again for the expulsion of the placenta; for we must still recollect the grand object is the contraction of the uterus, without which its being emptied would produce very little good; it will then happen, that the same contraction which expels the placenta will diminish the area of the vessels, and the danger from flooding ceases. But if this contraction do not take place soon, and the hemorrhage continue for some minutes after the extraction of the child, we must consider whether the strength will not be lost, and the safety of our patient endangered: if so, the placenta without delay must be separated by introducing our hand.

*Immoderate Discharge of the Lochia.*—The next view of uterine hemorrhage is that where it does not stop on the extraction of the placenta. Such cases as these are very rare; there may be a sudden gush of blood, and often is, following the placenta; the reason of which is that the uterus, at the time it expels the placenta, forces down every particle of blood with it; and in this way a pound or a pound and a half may escape, but that need not be regarded in the least; it does not affect the constitution, because it was not evacuated immediately from vessels; it was lying in the uterus. So when we amputate a limb, there is no loss of blood to the constitution, because the whole of the blood which is taken away is necessary to the limb; and no longer necessary than while the limb was to be supplied. But supposing that from the vessels not being properly secured in the operation, there is a bleeding afterwards from the stump, then it is that the constitution suffers; there is a demand made

upon the mass of circulating fluids, which must be replaced before the heart can recover its proper balance in the system. Apply this to the uterus, and we shall consider the blood as belonging to the gravid uterus, and not to the circulating system. This is what is in the practice of physic called an immoderate discharge of the lochia. Such hemorrhages frequently arise from the cord being pulled with too great violence, by which the placenta comes to be injured; and this happening when the uterus is not disposed to contract, the vessels will for a time remain exposed and bleed. This is the reason why it happens so frequently in the hands of bad practitioners, as midwives; and that it is so rare when no improper treatment is adopted in regard to the placenta.

Now supposing the hemorrhage yet remains, that is, after the uterus is emptied, the child is born, and the placenta come away; what are the means next to be employed to restrain the hemorrhage? the application of cold, and the abstraction of heat in every possible way; we should take the clothes from the bed, leave nothing but a sheet to cover, and that from motives of decency alone. If there be a fire in the room, it must be put out; the windows kept open to preserve a cool and fresh air, and if the patient be faint she may have a cup of cold water.

Cold water and ice are the proper applications both to the parts themselves and the body round them. The coldest water made colder by throwing two handfuls of salt into a couple of quarts of it, may be used by cloths many times doubled dipped in this, and laid over the back and abdomen; besides which, we may with the greatest advantage expose the body to a great degree of cold if it can be done.

If these means do not answer, we must introduce ice into the vagina, or even uterus; this will often succeed; if this be ineffectual, we must as the last resource plug up the vagina with lint or tow, or something capable of entangling the blood; for while there is a clear channel there will be no coagulum formed. If the flooding still continue, the best plan is that of carrying something permanently cold into the uterus itself; a large dossil of lint dipped in the cold solution will carry up a great degree of cold, but the best thing is to carry up a piece of ice, and allow it to thaw in the uterus. Dr. Baillie, of New York, was the first who introduced the use of cold applications here; he was in the habit of using a ball of snow for this purpose, which often stopped it directly, when nothing else would. Ice being introduced into the vagina, will often prevent abortion; this then is the best and last remedy in floodings; if none of these things will stop it, there is nothing else that will.

After the hemorrhage has ceased, the patient will be so reduced, so exhausted, the action of the heart so weak, and the quantity of blood circulating so deficient, that our first care must be to supply the waste, and remove the greatest danger, which is that of the patient's having been exhausted beyond the point at which the constitution is able to rally, and recover itself. These cases must be supported and stimulated; boiled milk with grated crumbs of bread in it, must be quickly cooled by spreading it on a flat dish, and when cool may be given as one of the most nutritious things that can be had; or good broth in which the grated bread is mixed; and if these remedies do not stimulate the heart and arteries, the probability is that the patient will die. In many of these cases the best stimulant is the volatile alkali, next to which brandy and water, the ammonia is preferable, because although the first effects of the spirits is good, it produces too much heat in the system at large; while that effect never arises from the volatile alkali. It is sometimes two or even three hours before we can leave such a patient in the certainty of her living.

After the flooding has stopped, we are not to consider the patient as safe. The fever coming on about the third day may be troublesome; nothing is so efficacious for it as the saline draughts, with laudanum to the amount of a grain of opium in the twenty-four hours. Immersing the hands and feet in warm water to about 80° Fahr. is useful; it brings down the pulse, and does a greal deal of general service.

After flooding, another circumstance requires attending to, a throbbing of the head and loss of memory, which will remain for weeks: in such cases there is nothing so good as purging, although the cause of the complaint be hemorrhage. The best way is to give infusion of senna with the Epsom salts, after which a draught of the decoction of bark.

*Consequences of the Placenta remaining, and its Treatment.*—The general treatment of the placenta has been already explained, where nothing more than ordinary attends it, together with the proper time which it may be allowed to remain. We will now consider the consequence of its remaining, and its treatment when it does remain.

It was said before, when it remained too long, it was necessary to pass up the hand and bring it away by separating it from the uterus. Some say that immediately after the child is born we should go up and bring it away, if the same pain which expelled the child does not separate and bring down the placenta. This is said to save another unnecessary pain. It is said the uterus will afterwards contract, and all will be well. The truth is, the uterus is meant to expel the placenta as well as the child: if it was necessary to have extracted the placenta directly as the child was born, nature would have made some further provision; all the works of nature are perfect in all their parts. There is a case in Haller where it was left to nature, and remained, it is said, thirty days. We should never think of leaving our patient while the placenta remains behind. When a woman is properly managed, it will rarely be necessary even to separate with the hand. In this Dr. Hunter's practice was exceptionable; he was in the habit of leaving this to nature; he used to leave the woman upon the child's being born, desiring the nurse to put the placenta into the bason when it did come away; that was enough for him.

We should never leave the placenta in the uterus; and if we have left it two hours, we should never leave it beyond that time. It is always right to bring it away. If it adhere to the uterus, we may introduce our hand as in turning, guiding the hand by the cord; we should then separate the edges of the placenta from the uterus, peeling it gradually and carefully off. After the whole is separated, we may make a feint to withdraw our hand to observe if the uterus will contract; if it do not, we should use a degree of pressure against its side, and it will generally bring on its action.

The placenta may be retained by a contracted uterus, of which there are two kinds, one in which the uterus is as long as before delivery, but narrower. This state will depend on too speedy delivery. We must patiently overcome the contraction with our hand, and separate and bring away the placenta, as in other situations. There is

little hazard in this case, as the ready contraction gives us less reason to fear the ill effects of hemorrhage, after we have got away the placenta. The other sort of contraction is that in which the uterus may be said to resemble an hour-glass, called therefore the hour-glass contraction; this must be overcome in the same way as the other. Whenever we introduce our hand to bring away the placenta, we must take care to bring away the whole; it has been stated that a part of it has been found in a state of schirrous adhesion to the uterus: now it certainly will adhere, that often happens; but of schirrous adhesion we know nothing. However we should always do a thing perfectly: if we set out with the intention of doing it at all, we should do it completely. It is better to leave the whole than a part; because if the whole be left, most probably the uterus will contract upon it, because it is a stimulus which the uterus is able to act upon, while part of it cannot be acted upon by the uterus with the same facility.

*Consequences of a Portion of the Placenta remaining.*—Pursuing the subject, we come next to the consideration of that state which arises from a portion of the placenta being left. No great inconvenience seems to arise till the third or fourth day, when the lochial discharge increases and becomes more offensive; the afterpains, which generally cease about the third day, remain after that time, arising from the tendency in the uterus to throw off what it cannot get rid of. There is occasionally a shivering fit, succeeded by heat, but rarely ending in perspiration. The pulse rises to 120 or 130, the patient becoming emaciated and very pale, though when the fever is upon her she looks as if painted: by degrees the hectic flush lessens; the pulse becoming smaller, acquires a wiry hardness, and this continues: the woman becomes tender at the lower part of the belly when it is pressed upon, though it is not violent pain as in puerperal inflammation; frequent retching and vomiting now arise; and if she live long enough, hiccup succeeds to the last symptom, together with which the mouth and tongue become sore; she is at length worn out by all this, and lays down her head and dies.

The discharge becoming greater and more offensive, is the best marked symptom, and frequently causes the death of the woman. This does not strike those people who happen to attend without being practitioners in midwifery; they see the fever, which they attribute to the effects of lying-in, and they hope it will soon get better.

*Inverted Uterus.*—This happens most frequently in the practice of female midwives, they being more in the habit of pulling away the placenta; and they in this way invert upon the same principle that the finger of a glove is inverted when a string is passed up the inside knotted to the end of the finger, and then drawn down the interior.

In pulling at the cord it will often happen that the placenta will separate from the uterus, at the same time that the inversion takes place, and the operator is not aware of what has happened; now however this is produced, the effect is in all cases the same; it may be attended with profuse flooding, or the uterus may contract. It is lucky if a flooding come on, since it may lead to an examination, when the tumour will be felt in the vagina, and must be returned, the fundus being reduced first. It should be done as early as possible. The difficulty consists in the os uteri forming a sort of ligature behind, which prevents the return of the uterus through it. When the os uteri is before us, it is easily dilated; but when we have to work through a substance to it, the case is changed.

Sometimes hemorrhage will take place early after delivery; and whenever it does we should always examine: there is no difficulty in examining, and it ensures the safety of our patient. If we know of the case directly as it has happened, and we return it, there is an end of the mischief; but if we neglect to ascertain its existence, till the next day only, we stand a very fair chance of losing our patient; it will be hardly possible to reduce it, unless attempted directly.

It is, then, of the utmost consequence that the practitioner be careful in extracting the placenta: and that he never pull the cord forcibly till upon passing his finger up the vagina he feel the root of the placenta; for he may be then satisfied that it has separated.

Reviewing then what has been said upon this division of labours, we find that it comprises difficulties of two descriptions: the one resulting from what has been called cases of arrest or of impaction; and the other from merely collateral circumstances. It is rarely that the aid of instruments can be of service, or ever employed in the latter description; while they may very frequently be of the utmost assistance in the former. We call it a case of arrest when the head has got down into the pelvis and remains unmoved, not because there is too much resistance, but because the woman is too weak for any further exertion. The state of things in arrest is very different from that which happens in impaction: in arrest we find the head not compressed, nor the scalp drawn into folds or swelled; the stools come away naturally, and the woman makes water easily: and with regard to the constitution, it is languid and weak; in short, she is a very debilitated woman. What then will be the consequence, from this view of the case? Is the woman likely to overcome the difficulties now the powers are worse? No. Is there any danger with regard to the constitution? No. While there are a number of little pains which last four or five days, is it right to leave a woman? No. Then why not deliver her with forceps, in which there is no danger; it is only bringing along the child, while the mother has not power sufficient to do it herself. In a case of impaction, the powers of a woman may be as good as those of any woman in the highest health. But there is a resistance which cannot be overcome, so that things are very differently situated to what occurs in arrest only. The bones of the head are wrapped over each other, the scalp is swelled and wrinkled, and is so altered that upon any person feeling it who had never been at a labour, he would guess it to be any part but what it is. If it be a genuine case of impaction, the head will be locked in the surrounding parts, producing a stoppage of the evacuations of stool and urine; so that on this account it would be clear that the head filled the aperture of the pelvis.

In the next place we must attend to the constitutional changes: for the first twenty-four hours after being taken in labour, the woman works away very vigorously; while during the last twelve hours, the labour will hardly make any progress, and she is sweating extremely; this state will at last change, it will gradually sink down to a mumbling, half delirious state, wandering and low. No woman should be allowed to go into this state; and if she be in such a situation, she should not be allowed to remain in it. For if the pressure of the vessels upon the brain be

allowed to continue, she will become apoplectic. Besides, there will be harm done to the abdominal muscles. What good will be done by allowing the woman to deliver herself, if the vagina and the bladder slough with the parts around which is another thing that may happen? In a consultation that was held on a case of this kind, it was agreed that nature certainly should be able to deliver the woman; she therefore was not interfered with; she did deliver herself, but lost her life for it; she died, and that at a time when an ear was to be felt, which certainly was a piece of barbarity.

It is safe to assert that if, after we are able to feel the ear, the woman is not delivered in six hours, we ought always to deliver with instruments. We know that in strangulated hernia nature has, in one case out of fifty thousand, made an artificial anus through the side after the parts themselves had sloughed off. But are we for that reason to avoid operating for the strangulated hernia? are we to leave the patient to the powers of nature? There is not any difference between pushing a man into the water, and not helping him out of it if we see him drowning; neither in the same way is there any difference between destroying a woman purposely, and the neglecting to employ those means, which, when she is in danger, will certainly save her life. There are many other cases, in which the forceps may with propriety be used: hœmoptoe, syncope, flooding, presentation of the navel string, rupture of the uterus; all these occurrences justify their application, provided the case is within the power of management by these means, either forming impaction, or arrest.

We proceed therefore to examine into the origin and nature of the instruments usually and advantageously employed on such occasions.

### ORIGIN AND USE OF INSTRUMENTS.

Sometime towards the latter end of the century before last, two instruments were invented; the vectis and the forceps. The vectis is what the name implies, a lever which is intended to assist the delivery of the child's head. The forceps consists of two levers joined to each other in such a way that the fulcrum of each blade is found in the opposite half of the instrument.

In employing a lever there are three points to be considered; the point of action, the moving power, and the fulcrum or intermediate space between the two. In using, then, the vectis, the point of action is the head of the child. And here it is too obvious to need mentioning, that the force applied by the instrument must be equal to the resistance, if not superior to it; and then the mischief may arise to the parts of the child's head so acted upon, producing much injury: the ear may be injured; the lower jaw or zygomatic process of the temporal bone may be broken; or any part of the surface from the pressure may slough off: these evils are by no means imaginary; there are various instances recorded of each of them, and that under the hands of the most careful and dextrous men. When an instrument of this sort is used, it is proper to make the hand the fulcrum on which it acts: now if the force required be but small, this may certainly do well enough; but where great force is required, this is a very bad support; besides the bony parts of the pelvis lie so convenient, that we may rest our instrument on almost any part of it; yet we should recollect that whatever part we convert into a fulcrum we injure, more or less, according to circumstances: if we apply it over the symphysis pubis, we press upon the urethra; or if in other situations, we shall injure the clitoris, or vagina.

Wherever we find the ear, over that part is the application of the instrument to be made. The injury done to the soft parts will be greater in proportion as we attend less to their safety than to that of the perinæum. The integuments suffer again, if we attend to the fulcrum, by which we get a lacerated perinæum. So that we either cannot use much force with the vectis, or, if we do, it will be to the certainty of doing much mischief. All these circumstances will depend, however, on the smallness of the difficulty to be overcome; and if there be no great danger, there will not be much difficulty or pressure.

The forceps has many advantages which are of some consequence to mention. The forceps has thinner blades than the vectis, and one objection against the use of this last instrument is, its being so very liable to do harm at its point by pressure; while another objection is, that as the force is applied higher up, so it makes the head flatter in proportion, and increases its volume in the direction in which it should be lessened. In the next place, if we consider the vectis, we find that whenever its pressure is applied to the upper part of the pelvis, it must increase the volume of the head applied to the lower part of the pelvis; while we know that the forceps, so far from increasing the size of the head itself, is capable of compressing the head in such a manner as to bring it into a less compass than before; so much so, that the head included in the blades of the forceps shall altogether occupy less space than was before occupied by the head alone. It may here be objected, yes; but the head is compressed by this means. Yet granting that it is, we know that at the same time the child is able to bear that compression without the least injury. Besides the practice is justifiable upon other grounds than that of the pressure not hurting the child: for supposing that it did hurt the brain, no more force is used than what is necessary to bring the head along the cavity. It is only compressed to the size of the pelvis, and at any rate it must come through that cavity; therefore it must inevitably suffer that compression, whether conducted through by instruments or forced through by the labour pains of the woman herself. There are cases where the head being actually too large for the cavity of the pelvis, would never get through by the exertions of the woman alone. What is to be done? if no other resource be at hand, we must open the head: but here the forceps present, to save the child's life by the compression they are able to make. The truth is, that the brain of an infant will bear pressure, very well; so that as far as this goes, the forceps may all be very safely applied. We see that they do not act by any partial pressure, and that the action is diffused.

Another objection to the use of the vectis is, that it requires one of the hands to be employed as a fulcrum, in order to prevent injuring the soft parts against which it would otherwise rest: and while the hand is so employed, the perinæum is neglected to the hazard of its being lacerated; and if we choose rather to take care of the perinæum, the soft parts are violently pressed against the bone, by which they suffer great pain and injury.

The forceps consist, as we have already said

of two levers joined to each other in such a way that the fulcrum of each blade is found in the opposite half of the instrument; and now having two levers united by a joint, we need not look to the pelvis to furnish the fulcrum, neither need we neglect the perinæum. There is still a query, that if the forceps be so much better than the vectis, how is it that the vectis is still in use by some? for no other reason but because it is easier to use; for one instrument requires less skill than two, and for that reason it is preferred by those who have not more skill than they know what to do with. They say they think it is best, and with them so it is. The man is simple, the instrument, therefore, should be simple. The complex instruments are safer in the hands of those only who have learned all the uses of them, as well as the modes of managing them. Though as to instruments of every kind, the knowledge of them can never be taught; they must be used, before the management of them is acquired. It is only learned by practice; just as the habit of stopping the notes correctly on a stringed instrument of music.

In the application of the forceps we must first learn the state of the pelvis; if that be narrow or deformed, we next calculate whether the head can pass; if it be too small, the forceps are useless. It is best never to apply them, but when we are able to include the whole in the grasp; to ascertain we should examine, and feel the ear; when we can feel an ear, the head is within the cavity of the pelvis. The reason why we know the forceps may then be applied is this; we know the instrument to be so much longer than the finger, that if from the os externum the latter is able to reach the ear, the former will effectually encompass the head. The next thing after feeling the ear is to ascertain the exact position of the head, which being done by examination of the sutures and fontanelles, we judge whether a change of position in the head might not enable the woman to expel the child by her own powers alone; and if we find ourselves unable to turn the head round, we may then apply the instruments to it as it lays; first feeling for the occipital bone and fontanelle: and if in examination we be able to feel the posterior fontanelle, we know that the occiput must be somewhere in the range of the pubes, which will be more precisely determined by the direction of the sagittal suture.

Supposing this known, the instruments are to be applied, the convex sides of the blades to the cavity of the sacrum so as to accord with the direction of the axis of the pelvis. Before the introduction of the forceps, it will be necessary to dilate the parts gently, especially if it be the first child. The blades of the forceps must be greased before being passed, to ensure an easier passage, and then one blade first is passed gently up between the finger and head of the child; because by this means we are certain no soft parts can be injured or pinched by it; further than the finger will reach we must depend on the proper direction of the instrument, which should at its point be pressed towards the centre of the head, and passed forward with a gentle riggling motion, which serves to form itself a space between the uterus and head, taking care also to keep the handle of the forceps outward, so that we may assist our intention of keeping the point of the blade close to the head. In carrying the instrument up, we should always put the woman upon her guard to warn us if we give her much pain, because if we do, we know that we have pinched the uterus, and should then withdraw the blade a little way and then return it till we get as far as necessary without much pain; which being done, the other blade is to be introduced in the same manner; which is easily accomplished after the introduction of the first. Both blades being introduced, the instrument is next to be locked; and it is convenient to pass the finger several times round the lock, to see that no hair or skin is included which might give some uneasiness to the parent at the time of using the instrument: and before beginning to operate it will be as well to take the forceps and give them a sort of vibration or shake, that we may feel that we have the child firmly by them. We should then explain to the patient that every thing relative to the application of the instrument is done; but that she must not expect our assistance will give her no pain, for it must give pain, though less than she would feel in her attempts towards expulsion while unassisted. It is not possible to bring the child into the world without pain.

Now we must remember that labour pains are not continual; therefore we must not use the forceps as if they were. The head will not bear constant pressure, therefore we must desist every now and then, beginning with the least possible force that is of any use, which may be easily increased as may be necessary. We should rest frequently, and from time to time go round the head with our finger to see how the business comes forward; always satisfying ourselves that the instrument still encompasses the whole of the head. The motion we make with the forceps must be slow and gradual, inclining them very gently from side to side, or from blade to blade; always acting in a line with the axis of the pelvis, till we can feel the occiput, when we move with regard to the axis of the vagina; using in the latter part of the operation very little force, for the head requires very little force to bring it through the vagina.

*Deformed Pelvis from Rickets*, or *Mollities Ossium*.—In both these diseases the cavity of the pelvis, that it is impossible for the child to be brought down it whole and alive by any means: and hence when we meet with deformity from either of these sources, our first question should be whether there be space enough to allow the child's head to pass? If the space is above three inches, it is sufficient, and the head may pass. Where it is less than three inches it is not sufficient, and the head cannot pass; the question is then changed, what method have we to bring the child out of the body, if it cannot pass through the pelvis? And here has been proposed to cut it out from the body, by the following operation.

*Cesarean Section*.—This has been performed in two ways, by an incision obliquely carried through the side; or through the linea alba directly down. The object proposed in this operation is to save the life both of the mother and child. It is of great antiquity. It is said that Julius Cæsar was taken this way out of the body of his mother; but there is no just ground for believing such a report: many historians held him as so remarkable a man that they were determined he should not come into the world like any other person. If it had been so, is it not strange that Pliny, who wrote so soon afterwards, should devote a chapter entirely to the history of a living child being cut out of the body of the parent who was dead, and yet mention nothing of Julius Cæsar having come the same road? Scipio Africanus is said to have been introduced by the Cæsarean section, but there is no reason to believe

it. It was never known otherwise than as an operation recommended till the sixth century in Paris. It was also once performed in Holland by a sow-gelder upon his wife. It is remarkable that the same woman was afterwards pregnant; but when her husband proposed the operation again, she declined submitting to it, and was delivered without. The surgeon who strongly recommended it in Paris was Rousset, who never lived to see it performed, on account of the opposition he met with in opinion from Ambrose Parée and other eminent surgeons.

The manner of performing this operation has been much disputed: the lateral incision appears to be the best; because we divide one muscle and it retracts, we divide the muscle under it and it retracts also; but the whole of the incision will not be a direct line through, so that we stand a better chance of saving our patient, as far as exclusion of the air may have a good effect, when the parts come afterwards to unite.

Of the two plans of performing the operation the lateral incision appears to be the best; and in making it we must attend to the following points: the woman may die under the operation itself; or shortly after, from the loss of blood; from exposure of the cavity of the abdomen causing extensive peritonæal inflammation; from the parts suppurating instead of uniting by the first intention; or from inflammation being so violent as to prevent the formation of matter, producing mortification. Yet if we look at the cases of this kind that are recorded, we shall see the fairest accounts that could be written, the death of the patient never being attributed to the operation, but to some trifling cause, perhaps relating to diet; such as a small glass of wine, or a few grapes producing inflammation of the peritonæum, or diarrhœa. This is decided upon without considering the probability that the diarrhœa or peritonæal inflammation may have been produced by the operation alone. These things should be considered fairly, and not viewed with the partial eye of him who has performed the operation. We see that on the continent this operation has been very rarely successful, according to Bourdelet, not in one case out of ten; and when we enquire how often it succeeds in our own country, as more nearly concerning us, we find that it has uniformly been fatal, that is, that all the patients have died from it; there is not a single solitary instance of recovery. It has been performed in London, Leicester, Edinburgh, and Manchester, by the best surgeons of those places, and there are none better in the world; but all the patients have died.

Nevertheless whenever the operation is performed, it should be done with a view of preserving both lives, because it is a safer way of delivery to open the head of the child. In mollities ossium, indeed, the disease is continually going on; no case recovers; it always destroys the woman. And here it is certainly advisable to perform the Cesarean operation, though not with the hope of preserving both lives; but that the woman is hardly more sure of dying after the operation has been performed than she was before.

In all cases of mollities ossium, then, the child being ascertained to be alive, the Cesarean section should be performed; in all other cases the life of the child should give way to that of the mother: and the head should be opened.

*Signs whether the Child be alive or dead.*—From the reluctance that every one must feel in opening the head of a child, it will be still a satisfaction to us to know whether it be alive or dead. The marks then are these: in the first place, supposing the child is alive, the pregnancy of the mother will continue to increase to the end of her time; and in labour the presenting parts will have a firm elastic feel; the cuticle and hair will not come away on the finger: besides which there will generally be a pulsation at the fontanelle. But the navel string being pressed, may cause death; it may arise, and does often arise, without any cause that we are able to trace. We know that a child may die in utero from affections of the mind in the woman. The death of the child may be known by shivering fits preceded by a sense of coldness in the abdomen. While the child is alive, it assists in supporting its own heat, but when dead it necessarily must obtain a degree of heat by robbing the mother of part of the heat in the parts around, which explains the sense of coldness that is felt. The breasts, while the child is alive, increase, and continue firm and well supported; but when the child dies, they immediately become flaccid and empty. So that a woman frequently used to miscarriage will foretell its approach by this alone. While the child is alive, it gives the sensation of a living weight, a weight which is capable of adapting itself to the different positions of the mother; but when death deprives it of this power, the woman feels it flap from side to side according to the way in which she moves. She becomes sensible of weight to a much greater degree than before. Besides all which, there will be the cessation of motion in the fetus, which is always perceived by the mother some months before delivery. These are so many signs of the child's death, which may be observed, before labour comes on.

There are others which accompany labour: first, as the child is dead, the membranes will be dead also; and for that reason will break earlier than they otherwise would. It has been said, that the liquor amnii being turbid, points out the child being dead: but this circumstance sometimes arises while the child is alive and well. The strongest sign is one by which we may tell it before even we see the woman; it is by the waters being corrupted. The smell of putrefaction will sometimes decide the opinion of an experienced practitioner the instant he enters the door; also in an examination, from the meconium coming away on the hand, in consequence of the sphincter muscle being putrid and relaxed. The sutures of the head vacillate like bones in a bag. When we examine, the hair and cuticle will come away upon the finger.

When all or even the greater part of these signs are united, there can be no possible doubt that the child is no longer alive.

*In what Cases the Child's Head should be opened.*—These cases are syncope, convulsions, hæmorrhage on the part of the mother; hydrocephalus internus on the part of the child. This last disease may be ascertained by examination, the sutures and fontanelles being at a greater distance than they should be, and the whole cranium very imperfectly ossified: but the most unequivocal evidence is the head's not entering the pelvis; by which we know that the head is too big for the pelvis, or that the pelvis is not large enough to receive the head into it, which is the same thing in effect.

When all the stages of labour are gone through, and the head is not advanced, we are led to examine and find out what the state of the child is. When we have ascertained the existence of a de-

formity of pelvis, we may generally tell the space left for the child's passage, by passing the finger from before backward; that is, from the vagina; the space under the arch of the pubes, backwards and rather upwards, toward the projecting front of the sacrum, where the first lumbar vertebra rests on it. Now in a well-formed pelvis this cannot be done; it is not possible to reach the sacrum in this way; but in a deformed pelvis we may ascertain the space pretty accurately: when the distance between the projecting part of the sacrum and the symphysis pubis is upwards of two inches, the delivery is very simple; it would be well if it were less so, as then it would not be so frequently adopted as at present. Many a practitioner has sacrificed a child's life at the shrine of his own ignorance. It is much easier to apply the perforator and open the head of the child, than it is to apply the forceps; in the latter some considerable skill is required, in the former none.

*In what Manner the Head is to be opened.*—The necessity for this operation being manifest, we must proceed as follows. First empty the bladder, then throw up an injection, that the rectum may be also cleared; next introduce the hand into the vagina up to the os uteri, upon which we are to pass up the perforator, guarding the point with the utmost care, while passing it up, by means of the other hand purposely introduced before the instrument. The points of this instrument are guarded by stops, by which, when we push the points through the child's head, we avoid the danger of their passing too far, and, by coming through the opposite side of the head, of wounding the uterus. The way they are used is this: we bring the points upon a suture or fontanelle, recollecting that when they are introduced, the handles are close together, and consequently that both the points form one perforator; now when, by the hand in the vagina, we have laid the points opposite the part of the head we intend to open, we press the instrument down with force sufficient to make it pass through the integuments: which being done, and the perforator pushed in up to the stops, we are next to lay our hand between the handles, and press it up between them to the joint. The effect of this will be, by its acting as a wedge to force asunder the points, and to dilate and tear open the sides of the wound before made; we next close the sides of it and change its position, so that the handles will have their rings in a horizontal position; we then open the instrument again as before, which gives us a cruciform opening. This being done, the perforator is next to be pushed into the head, and screwed round backward and forward, so as entirely to break down the consistence and connection of every thing within the scull; this will generally be sufficient, the pains will quickly press out the cerebrum, which may be removed from time to time; or we may scoop it out with a table-spoon.

If the pelvis be not greatly deformed, the delivery may now soon be effected; if it be, we proceed to remove the bones piecemeal, taking care to guard each piece through the vagina by laying the scabrous edges of it against the hand, which during the whole operation should be in the vagina. The sides of the two points of the perforator which come against each other, when the instrument is shut, are made rough, so that as with a pair of pliars we may take hold of a bone which is too large to pass, and break. In this way we must bring away the frontal bone, and occipital bone; the temporal bones and the parietals; after which, in order to have a firm hold, we should lay the scalp as far over the parts within as we can, making a sort of flap to lay hold of. It is best to put on a glove well greased in order to catch hold with. It will sometimes answer very well to carry up the blunt hook, with which we may occasionally be able to catch hold somewhere so as to have a good purchase; but it is very apt to slip, as it has no point. If it do slip, we can then only pass the crotchet; in the construction of which we should observe that the flat point, at its sharp extremity, looks inward; so that if laid to a surface parallel to it in direction, it will not be able to peck into it, or wound it. When using the crotchet, we should begin with as little force as may be attended with a good effect; since if not sufficient to bring down the head, it may be easily increased; recollecting that whenever this instrument is using, we must always keep that hand which is within the uterus directly opposite the beak of the instrument, so that in the event of the parts of the child giving way no accident may happen to the uterus. We should use a force that we can command; and if the pelvis be of sufficient dimensions, bring the body down without removing any more than the head; for when once the head is delivered, the body will soon follow, as it is easily compressed.

Where the deformity is very great, and the passage very small, we should begin to open the head very early in labour, puncturing whatever part we first reach by a hole drilled up to the stops. We should then cease, and trust in some measure to that putrefaction which the moisture and warmth of the parts will be sure to produce instantly. This putrefaction will proceed very rapidly; and the bones, and indeed the whole body, will come away easier, separating from each other with infinitely less force than before they could have done. When the patient cannot be left longer with propriety, after about thirty-six hours, we may proceed to bring away piecemeal the various bones of the cranium; the temporal, frontal, occipital, and parietal bones; after which the remaining part of the head will only be the basis of the skull, which admits of being placed in a more favourable position for passing through the pelvis; for the parietes being carefully laid over the bones whenever they may be felt exposed, it will protect the uterus from injury, and then if the remains of the head be brought forward, and doubled down with the chin to the breast, it will, in this state, be frequently capable of being delivered. This sort of labour is very tedious; it lasts a very great length of time: but it requires no skill. We must be aware, that when we have brought the head down, we must not always expect the body to follow as in other cases, but shall sometimes be obliged to bring away the whole child by pieces. It may be necessary, in order that the body may pass, to take out the heart and lungs, and every organ one after the other. All the caution that need be given is to take care not to injure the woman, in doing what we are about, neither in separating the parts nor in bringing them away.

*On facilitating Labour by turning the Child.*—It will sometimes happen that in spite of a slight deformity of the patient we have a chance of saving the life of both the mother and the child. There are two modes of attempting to do this: the first is by turning the child, which will also apply to other cases as well as deformity of the pelvis; the second by bringing on premature labour.

Turning is not the best of the two resources, but many women will submit to this, who will not

submit to the proposal of bringing on premature labour.

After turning a child, we may pull it though by the feet, while we never should have been able to have delivered it without, for the uterus would not have been able to push it through, in the common way of presenting with the head to the os uteri; and if we are able to save the child's life it is a grand point. If after we have brought the feet down, the head will not pass, even then we are only where we were at first, and can open it.

*On bringing on Premature Labour.*—The operation that is certainly the best method of managing delivery in deformities which admit of it, is premature labour, which is founded upon these positions; that during pregnancy, the head of the child is increasing in size, to the time of delivery; so that if we take them in their gradual increase of size, it is pretty plain, that one in the early months of pregnancy would pass with ease through a pelvis that would not receive it at a later period; and in this way, by considering the case in all its parts, comparing the diameter of the pelvis with the size of the head at different periods of the pregnancy, we shall be able to calculate the time when we may bring on premature labour, fixing either the seventh month, seventh and a half or eighth month, but never later, for if we do, the head will be too much ossified to submit to the pressure it must sustain, with that ease which is necessary to the delivery being perfectly safe. It may indeed be brought as early as five or six months, but the child then cannot be expected to live; and if it be produced later than eight months and a half, the labour will be as difficult as that at nine months.

The first step towards bringing on premature labour is to carry up a male catheter through the vagina to the os uteri, and to introduce it with care, in such a manner, as that the point of the catheter shall be in contact with the sides of the uterus, using a gentle pressure only. When the extremity of the catheter is against the membranes, but clear of the child, the instrument is to be thrust forward, so as to break the membranes; and in this the catheter is preferable to a rod of silver, since as soon as the catheter enters we know the object for which we introduce it is gained; for while the instrument is still in our hand, we shall feel the waters passing off more or less; while if a solid rod be employed, it may be necessary to introduce it a second time. In puncturing or breaking the membranes, it is also preferable to get the instrument some way up the side of the uterus, instead of breaking them immediately upon the os uteri, because in the latter way the child is most frequently born dead; which depends on the different effect with regard to the flowing off of the waters, produced by the mode of puncturing or breaking the membranes.

The breaking the membranes at the side only allows a partial escape of the waters, quite sufficient to produce a disposition to contract in the uterus, without permitting any injurious effect to arise from pressure; while on the other hand, when they are broken in the front, the whole of the waters flow away, the uterus contracts very strongly round the child, and the circulation generally suffers, and is either partially or completely interrupted. Delivery, by bringing on the action of the uterus prematurely, is for many reasons very estimable: a month or two before delivery naturally produced, the head is not only smaller, but more compressible; there is a less proportion of bone; so that if we take two heads of the same absolute size, one being of eight months formation, and the other seven, still that at seven would have the advantage in passing through a narrow pelvis. It is difficult for any one to determine the time which should apply to different pelvises; but where the distance between the pubes and sacrum is under three, yet all but three inches, eight months may be allowed; where the distance is two and three quarters, seven months; and so on. Yet when a child is born at seven months it will rarely suck, and requires the utmost attention to be reared. By these means, then, we may be able to save both lives; by the Cesarean section we certainly lose one life; and by doing nothing we lose both.

*Preternatural Labour.*—We now proceed to a consideration of the third class of labours to which we have divided our subject, and which are generally denominated preternatural, or cross-births; including all presentations but those of the head. This class is naturally, therefore, divisible into presentations of the lower and presentations of the upper extremities: and to this subdivision we shall adhere.

We know little of the cause of preternatural presentation: perhaps it depends on a peculiarity of form, either in the uterus or pelvis. It is said to arise from accidents, because there are more instances of it in the lower walks of life: that is very true; and there are more aquiline noses among the poor people than among the rich; and more noses of every kind, because the truth is, there are more individuals in one class than in the other: preternatural births are most likely the effects of peculiarity of shape in the parts. In this kind of labour sometimes the lower extremities present, and sometimes the upper. We shall treat of each presentation.

*Presentation of the lower Extremities.*—Now this division of labours is capable of being finished by the powers of nature alone; and the only consequence would be upon the child, to whom such delivery is not always safe, for when the feet present, and the child is gradually expelled, the child in figure forms a cone, which all along increases to the shoulders, and the head is born last of all; the navel string would be born long before the shoulders were disengaged, the effect of which would be that the circulation would be interrupted in the cord, and perhaps suspended; for pressing the navel string before birth, is the same as pressing the throat after it; each produces death. After this observation, we have only to remark that when the cord comes down by the navel passing through, a portion of the cord should be drawn slack after it, that it may not be stretched by the child's passing under the pubes.

When the feet or breech have presented, there is plenty of time to turn the occiput to the pubes long before the head is down. Whether one foot or the breech presents, it is better to let it come so, than to go up, and bring down either one or both feet; because in breech presentations, the parts are gradually and well dilated before the cord is likely to be compressed; therefore it is safer; besides the inferior extremities in breech cases lie upon the sides of the abdomen, by which they protect the navel string lying between the two from any pressure whatever. So that we see all breech cases should be left unturned; and we may ascertain the breech from the head, by feeling the parts of generation, as well as various depressions without that uniform defined resistance

which is given by the head. When the breech presents the meconium will generally come away by the pressure squeezing it out of the abdomen. Suppose that in a breech presentation any accident happen to the woman, needing immediate delivery, it has been said that the forceps may be applied; but from frequent trials we can say that they are of no use; they are not calculated to hold such parts, and always slip off. Another plan recommended, is to get a handkerchief between the thighs and the body: this is an exceeding good purchase, but in the living subject we can scarcely do it; we cannot get it between the legs and the body. If neither of these plans succeed, there is only one remaining; this is the carrying up the blunt hook, and so placing it over the thighs; this certainly commands the delivery, and where a small equally applied force is sufficient, it will be both successful and safe; but as it is self-evident that iron must be always stronger than bone, there will be a great risk of breaking the thigh bones by this instrument. Yet the woman is not to die to save the child's thigh-bone from the risk of being broken; and it is certainly better to have to treat a child with its thigh broke, than one whose brains have been all scooped out. We should however be careful never to employ the least unnecessary force.

The feet being born and the breech passed, the part which next presents is the umbilicus; and as the body afterwards passes further down, the cord will be both pressed and dragged, and if a cylindrical yielding cavity be dragged, the cavity of that cylinder is diminished in its calibre, and the tube will ultimately be obliterated; so that the best practice will be, as soon as a part of the umbilicus can be felt, to pass up the finger and bring down sufficient to prevent its stretching in the progress of the expulsion; and as soon as the head is in the pelvis, to bend the face down, bringing it forward upon the breast of the infant, and opposite the os externum, by which means the child will commence breathing; and if the navel string only pulsates up to that time when breathing commences, the child is safe in all that regards suffocation; and as to the head remaining within the os externum, it is of no consequence whatever. If the child's head cannot be brought through, we may pull, drawing it with caution. Some practitioners will pull the child very hard, which is quite improper; not that it is any material object to the woman, but to the child, the force being applied with the hopes of the child's being born alive; but is it very likely that its life will be saved, after a leg or an arm is pulled off, or after the body is pulled so hard as nearly to be separated from the head?

*Presentation of the upper Extremities.*—The other division of this class of labours, is that in which the upper extremities present. This is now and then an original presentation, but sometimes it is artificial. It may be called original, if felt before the membranes be broken in the absence of a pain. It may be called artificial, when the hand being felt by the practitioner, perhaps with some other part, it is drawn down though the os uteri, and the position of the presentation varied; though it originally was a head presentation, it may be made a shoulder presentation. When the hands are at the os uteri, they are easily distinguished from the feet, by the thumb not being in the same line with the fingers; while in the foot we distinguish the toes and heel. The shoulder has been mistaken for the back, and it is a mistake easily made in practice. In distinguishing, we should recollect the superior extremities have the scapulæ behind them, while at the breech we feel the organs of generation. We may here lay down a rule which is of the greatest consequence, and applies to all kinds of practice in midwifery; that is, that the shoulders and arm will never pass together: the labour may continue, but if that presentation be not altered, the woman will be worn out and die. We must return an upper extremity; and never regard it as a matter of choice, but as a rule of practice, which must always be adopted. We must turn, because it is a presentation that cannot be delivered. This altering the position of the child, in utero, is called the art of turning, which art, in modern science, is attributed to Ambrose Paree, though it is mentioned as far back as the time of Celsus, who says it is sometimes necessary; he does not, however, say whether it were ever done on a living child. Ambrose Paree's words are, "that in all cases where the upper extremities present, you must turn and bring down the feet; and if the midwife cannot do it herself, she must send for a surgeon who can."

The nature of these presentations may vary so much that it may be necessary to mention some circumstances. Suppose a case in which the waters are not yet discharged, and the labour is going on very naturrally, but by examination through the membranes between the pains, we find that an arm or shoulder presents, yet we may, perhaps, not know exactly the parts; in such case we should not be absent from the woman upon any account at the time of the membranes breaking, for it will make all the difference in the world, as relates to that labour. We must ascertain the exact position of the child, and we must then proceed to turning. The question now is, what time in the progress of the labour is most proper for this operation? Bourdelois says, when the membranes are broken, and the os uteri dilated. Dr. Hunter is of the same opinion. Dr. Clarke differs from them both, and justly; for he found that if we delay turning till the waters have come away, and the os uteri is quite dilated, we allow it to remain to the increasing the difficulty of the operation. If we take it when the os uteri will admit the finger and knuckles, it is the better time, because we then turn the child as if in a bucket of water; and this gives us so clear an advantage that it needs no explanation. This then is the most convenient period, and we should begin by dilating the os externum, previously intimating our design to the patient, cautioning her not to be in the least frightened at what we are going to say; we may then inform her "that the child does not lie quite right, but it may soon be set right, and with little trouble." It being then agreed upon, the woman is to be laid close to the edge of the bed; and we roll up the sleeve of our shirt, and pin it, anoint the hand and fore arm, and dilate by forming our hand into a cone, first going gradually through the os externum, taking our time, and being very gentle; but we should not pass on dilating beyond the vagina, until our hand passes easily through; if we do, we feel the inconvenience of it afterwards, by the contraction of those parts: having got our hand though the vagina, we may let it remain a while, and should a pain come on, it may waste itself on our hand. We should then gently begin again to dilate, til we get our hand into the uterus, when we turn the child gradually round, bringing the head to its proper situation.

There is no difficulty if we once get our hand

up through the os uteri, that being dilated sufficiently, without the membranes being broken. But suppose another labour, where the membranes are broken without the os uteri being dilated. We have here much more to do, and less chance for doing it well than we had in the other example; we must go on, and have to turn the child too, under the increased difficulty of the contraction of the uterus, which will not indeed be violent, but quite enough to render the turning difficult. But if we be able to manage the most easy case, and the most difficult, we shall be equal to all the surbordinate or intermediate degrees of difficulty that may be met with in turning.

To give an example of the greatest degree of difficulty, suppose a case, where the waters have been lost twenty-four hours, two days, or even three. What we have to do in overcoming the contraction of the uterus is not altogether a matter of difficulty as to skill, so much as it is as to time and management. With a view to lessen the difficulty, opium has been given, but great caution is required in its exhibition; since the woman has been known to die from the use of opiates, she has been drained to death by uterine hemorrhages.

The last circumstance necessary to notice with regard to preternatural labours, is that all the other parts being brought down, the head sometimes cannot be got through well. We may here use a moderate force, by pulling with the body, remembering that our object in using force is to save the life of the child. Besides, why should we use a force too great, when we may always deliver with the forceps? though where violence is unavoidable, it is best to open the head.

To employ that force which, without violence, may assist in bringing away the head, a good method is to make a sort of loop, by bringing a handkerchief loosely round the neck; when letting the ends down upon the breast, we tie them rather low on the breast, so that there may be plenty of room to place our hand within it to pull by; and if we succeed, we must mind, that in bringing down the head, we depress the sides of the head, so as to bring it into the hollow of the sacrum. If it will not come by any means, we must then open it; when we have extracted the brain, we should introduce the blunt hook, and it is used with the most effect when seconded by the pulling of the body.

In some instances it happens that the head is entirely separated from the body, when various means have been recommended for bringing it away. The only sure method, however, is to open it; and when we have dilated it by the opening of the perforator, we should introduce the crotchet, before we withdraw the perforator, in order to have the head always secure from slipping, as it otherwise would do. The difficulty is, that whenever we touch it we have a smooth slippery surface, which we cannot keep, unless we always have an instrument within the hole we have made. It will roll over the upper aperture of the pelvis. We must recollect always to keep one hand in the vagina, while any operation is going on, for the extraction of any body which may be within the uterus, and in order to guard the instruments.

*Disorders subsequent to Delivery*—Most of the diseases consequent upon pregnancy arise after delivery, and not during labour. We shall first observe that,

Quietude and a horizontal position should be strictly enjoined as a matter of the greatest moment. And for this reason it is obvious that as the patient should not be moved early, she ought never to be delivered in her clothes: this, however, is a plan often proposed by the lower order of people to save inconvenience and expence; but it never should be assented to by the practitioner, as it is a very dangerous experiment to raise the patient to an errect posture, at a time when she may remain perfectly safe in an horizontal position. There are many instances of the fatal effects of neglecting such a precaution.

A woman after delivery should remain perfectly at rest for at least two hours, and then should by no means be raised upright, but be very gently lifted just enough to allow the drawing away of the clothes; which if they give trouble must be cut away with scissars, to prevent the risk of exhausting the patient by over exertion.

*Fainting.* — Fainting after delivery frequently happens, and may arise from many causes, most of which are of little consequence; it is always an unpleasant occurrence, and sometimes dangerous. It may be merely the effect of fatigue; a woman is just able to bring the child into the world, and after making perhaps the last exertion she is capable of, sinks into a faint. Frequently she will fall into an hysterical paroxsym, which will easily be perceived by her laughing, crying, sobbing, &c. which characterizes hysteria. If the fainting proceed from either of the above causes, volatile alkali rouses the patient, and nothing more is necessary; neither should any apprehension be felt for her safety.

Fainting may be the consequence of the great agitation of mind which the patient has suffered from fear of the approaching pains, and, as she thinks, dangers. In such cases nourishing things should be administered, as a small quantity of good broth, with a table spoonful of wine in it, or some volatile alkali.

Whenever there is reason to suspect that the fainting arises from loss of blood, the practitioner should never leave it to probability, but instantly examine the truth of his suspicions, not only on the surface lying next to him, but the upper part of the further thigh, as the blood will sometimes run over the side of the thigh that is farthest off; when the practitioner, not perceiving any discharge from that part whence it is generally observed to flow, has not the least idea of his patient's situation. When upon examination it is found that hemorrhage has taken place, the placenta being got away, it is to be treated in the common way by acids, &c.

In some rare instances it has happened, that immediately after delivery the patient has sunk into a permanent syncope, from which she never has recovered, dying without a groan. When there is reason to suspect the approach of such a state, the patient should be made to swallow a large dose of volatile alkali; it can do no harm, and is generally highly beneficial, let the fainting originate from whatever cause; the spiritus ammoniæ comp. and tinct. lavendulæ may also be administered; and hartshorn should always be kept in a lying-in room.

After delivery it is advisable to apply a certain degree of pressure to the parts. This circumstance has been variously received and very generally misunderstood. A certain degree of pressure is useful, but if that pressure be too great, it will occasion worse consequences than the want of pressure altogether. The pressure required is more properly speaking a support, and is of the same kind as we like to feel from a waistcoat in

winter. The intention to be had in view in making it is just the same as after tapping in dropsy, and pressure judiciously applied in both cases will often prevent fainting.

*Suppression of Urine.*—In the country it often happens that a practitioner does not see his patient any more after leaving her safely delivered. In such cases, it will be necessary for him to leave general directions with the attendants, the most material of which is, that the nurse shall send for him, if, upon trying, the patient finds herself unable to make water, at the distance of eighteen or twenty hours after delivery. If the patient be neglected, the bladder swells to an enormous size, and at lasts bursts, in which case death is inevitable.

When the practitioner has been sent for, he must not be satisfied with the patient's telling him that she has since made water, and that a little escapes frequently; all this amounts to nothing, and must not excuse a moment's delay in the introduction of the catheter. It will generally be necessary to draw off the water once or twice a day; but from distance of residence, this will sometimes be impossible. In such a case it is not very difficult to teach the nurse how to perform this operation, by shewing her the parts, and pointing out the little orifice, at the same time telling her the instrument must be passed up carefully and slowly till the water flows from the other end of the tube.

*Effusion of Blood into the cellular Membrane of the Labia Pudendi.*—This is an accident which now and then happens after delivery. It is merely a mechanical effect of pressure, and very rarely occurs. In one case where the parts had been previously much strained, the swelling was first observed by the patient's finding herself unable to close her thighs together. This blood, if left to itself, will first coagulate round the orifice of the bleeding vessel, and afterwards the whole quantity of effused blood becomes fixed. There are two ways by which the parts may get rid of this blood, if its quantity be considerable; either by the skin sloughing off, by which part of the blood may escape, or by the part inflaming and suppurating. When the latter circumstance happens, and it is determined to open it, the orifice made cannot be too small, so that the matter be allowed to escape; for the constitutional weakness at such a time as this will give a tendency to gangrene in any part which is divided. Cold is the only application that is to be at all regarded. It has been recommended to cut and scarify the part, but this is objectionable, because should the artery continue to bleed after the openings are made, the situation of the patient at once becomes serious, for we must necessarily be perfectly ignorant where the ruptured vessel is, and consequently as perfectly unable to stop it. Should it ulcerate, the treatment should be the same as that of an ulcer in any other part of the body.

*Lochial Discharge.*—By this is meant that discharge which follows the expulsion of the placenta, continues for several days, and diminishes in proportion as the uterus contracts. A short time after delivery the vessels which before poured out red blood will, from the womb having contracted to a certain degree, only ooze forth serum. When small pieces of the maternal part of the placenta remain with fragments of the membranes, &c. and mix with the lochial discharge, they constitute what the nurses call the green waters; and these discharges generally subside in six or eight days, more or less. They will, however, often be reproduced by very slight causes; such as sitting upright, endeavouring to walk, eating stimulating food, or indeed any thing which may increase the action of the heart and arteries. In a strong woman of tense fibre the discharge will be of shorter duration than in a weak woman of lax fibre; if a woman be quiet it will not continue so long as if she be restless. Where the quantity is profuse, and it flows for too long a period, the constitution becomes weakened, and it is necessary to give bark with the vitriolic acid, or the conserve of roses.

*Lacerated Perinæum.*—The intermediate part of the body situated between the vagina and rectum is called perinæum; and from its peculiar situation is very liable to accident from the violence of pressure in labour: this will sometimes happen with the most careful practitioner; it will now and then give way in a trifling degree, and is in such cases of no further consequence than from its leaving the parts a little sore and weak for a few days. The only laceration of consequence is that from before backwards to the rectum, by which the os externum and rectum are laid into one, and the sphincter ani consequently torn asunder. This accident is, however, extremely rare, and may always be prevented by supporting that part of the perinæum with the hand.

In case of an actual laceration of the perinæum, the first step is to empty the bowels by a brisk purge; after the medicine has operated, the parts should be perfectly cleansed from all fœculent matter, and then the thighs should be bandaged together, by which there is a probability of the parts uniting by the first intention, and in some cases this has succeeded. Should this fail, the only chance is not to allow the parts to heal except by uniting with each other. If considerable inflammation takes place, it must be reduced by the use of fomentations and cataplasms, and of cooling laxative medicines; and if the pain is violent, opiates may be given. When suppuration occurs, bark must be administered. The dressings may be superficial.

*After-Pains.*—Every woman who has been in labour is subject to what are called after-pains, though they do not always occur equally. They come on at regular intervals, and are more or less violent. These pains are very rarely felt after a first lying-in; and they are less when the labour has been retarded, allowing the uterus to contract gradually behind the body of the child, than where the expulsion of the child has been hastened, the uterus then contracting suddenly but not perfectly. In consequence of these pains, and the fatigue which the woman has sustained throughout the labour, it is a very general and excellent practice to give an opiate of from twenty to thirty drops of laudanum, and afterwards to repeat it in such a diminished quantity as shall allay the irritation, but not the contraction of the uterus.

An after-pain will perhaps come on an hour after delivery, by which a large coagulum may be expelled; and after that others, by which smaller coagula will be separated; and then an after-pain as violent as any of the rest, to throw off one of the smallest possible size. To some women these are very distressing, and are borne with less patience than the labour pains, as the latter they know are for a good purpose, while the pains after delivery afford no such consolation, and yet are sometimes as violent as the worst pains of labour can be. These pains may be moderated by warm applications to the abdomen, and by small doses of laudanum.

*General Treatment of Women after Delivery.*—Prac-

titioners formerly had various ways of treating a woman after delivery. Of these the principal were the high or stimulating mode of treatment, and the low or starving system.

The best practice is to avoid both of these extremes, and to treat the woman entirely according to her situation; if strong and healthy, she may be kept for a few days upon gruel, barley-water, and toast and water; and then, if she be perfectly free from fever, she may eat a little animal food. But if of a weakly constitution, she may have animal food the first day; in the former case no wine should be allowed, in the later both wine and whatever else will nourish her should be administered. In general no meat should be allowed for the first three days; bread-pudding may be permitted, but if there be the least tendency to inflammation or fever, nothing further. With regard to medicine, much will depend upon the circumstances of the patient; the great object is to keep her quiet; and if this cannot be done without medicine, medicine must be given. A saline draught, either with or without spermaceti, will generally be sufficient; and at night a small dose of the sp. æther. vitr. co., which may be increased if the patient's nights are restless. It is of high importance, however, to give a purge on the third day. It is of little consequence what purgative is used, as long as an evacuation is produced. For many weeks before delivery the bowels of a woman are never emptied of their solid contents; and the quantity that thus accumulates is sometimes very astonishing. Should the purge not operate, an enema should be exhibited the same evening; after which not a day should be allowed to pass without a stool being procured, and this strict attention should continue for the first fortnight.

*Milk-fever* rarely or never happens where proper care has been taken to preserve a regularity of action in the intestines. Where the bowels are neglected, and there is a disposition to inflammatory fever, the milk being formed in considerable quantity, will greatly increase the tendency to fever.

*Sore Nipples.*—This is a complaint often met with, and very troublesome, and most probably arises from an artificial mode of living. Many women use considerable pressure upon their breasts, and under such circumstances it is natural to expect that the nipples being pressed in, may be absorbed altogether; or if this do not take place, they will give way upon the child sucking, and become sore and painful. If this have occurred in a previous lying-in, the parts may be strengthened by applying to them astringent remedies two or three months before labour. When, however, soreness of the nipple has taken place, the best way to protect it is to use an artificial teat, by which the child can suck equally well, and the nipple itself being undisturbed, will soon heal. The way in which one of these instruments is prepared, is to procure a fresh teat from a heifer, and scooping out the inside, steep the skin in spirits for an adequate length of time, and then fasten it on to the glass instrument; glass is preferable, because by seeing the milk we may be assured that the child is properly nourished. A woman is capable of giving milk with a flat or even a concave surface, by drawing it out with a glass tube that has a small ball to it, by which a vacuum is produced, when immediately as the glass is removed, the child being put to the breast will keep it out by sucking till satisfied.

Where the nipple is sore, it will either be from superficial ulcers, or cracks in the skin, either of which give excessive pain and distress; and it often happens that after all manner of things have been ineffectually applied, the nipple will heal of itself. Wine, alum solution, and all similar applications, give very great pain, though they seem to be the most beneficial remedies of any that are in use. Indeed it is extremely difficult to know what will answer best: if emollients be applied, less pain will be the immediate effect; but they make the parts more tender, which, when the child sucks, will frequently bleed; and this is unpleasant for several reasons. The child probably swallows the blood, and perhaps on being sick vomits it up again, to the great terror of the nurse, the mother, and all around them. If the sore be superficial, it will be much aggravated by sticking to the woman's clothes: in this case a little cup made of wax is a good protection. The limpet shell will answer the same purpose, the edge being covered with sealing wax; or a walnut shell may do equally well. A fresh ivy leaf laid on after every suckling is very useful, the fine glaze will prevent its sticking, and as it preserves the parts from the clothes, it is very pleasant. A careless woman who does not attend to these apparent trifles will frequently have the newly formed skin torn off from her nipple, by its fastening to the coverings of the breast. No plan, however, answers so well in all sore breasts as the false teat, as any application will then heal the nipple, or as it will heal without any.

*Swelled Leg of lying-in Women.*—This is the last disease we shall notice. It never arises before the third day, and rarely after three weeks from delivery. The disease occurs in women that have had hard labours, or easy labours; in strong constitutions, and in weak constitutions; where there is milk in abundance, and where there is none at all; whether the lochial discharge be great or little; and whether the patient be fed high or fed low. So that there seems to be nothing either in the nature or constitution of the woman which either causes or prevents it; neither would it appear to be affected by the labour, as it seems to arise alike under all circumstances. It is said to depend upon a translation of the lochial discharge, but this is very absurd.

It commonly begins with shivering, the swelling being perceived either general or partial in the leg; sometimes arising over the whole limb at once, and sometimes beginning in the ham. It seems to have some connection with the absorbent glands, as it frequently commences in the groin, from which part the swelling will continue to extend till the whole leg and thigh are as large as the body: in this way the leg will be extended to the greatest possible degree, without any redness or inflammation; but it will not bear moving; if the patient be desired to move the limb, it gives her great pain. Swellings in general will pit, but this does not; and it usually occupies one side only; and this is observed by Dr. White, who states that even the labium of one side shall be tumid, while the other is quite unaffected.

The swelling is of a peculiar character; if the hand be drawn across the limb, it does not give the uniform sensation which is commonly felt in swellings, but resembles an infinite number of irregularities difficult to be described. The best idea that can be given of it is to suppose a block, in shape resembling a leg, covered with brass nails of various sizes, and these covered with skin

stretched over it. The disease is acute, and the symptoms of fever will sometimes be considerable, and then it is by no means surprising that the secretion of milk is lessened, or the lochial discharge diminished for the reason, that the circulation is determined to other parts. In ten or twelve days the hardness of the swelling ceases, and the state of the disease is changed to a true œdema, and the limb remains weak for several months. Such a limb will always be more affected by cold than the other; after any exercise, as dancing, it will be more stiff and weak the next morning than the other. This disease sometimes attacks both sides in succession; it never occasions suppuration; Dr. White, indeed, mentions one instance of this effect, but it is doubtful from his description whether it was this sort of swelling, for œdema sometimes resembles it very closely.

It is difficult to determine the cause of this alteration of parts, or change of organization. Dr. White attempted to explain it, by supposing that an absorbent vessel gives way at its entrance into the gland, and that the lymph still passing upwards, overflows, and enters into the cavities of the cellular membrane, and their coagulating gives the unequal feel observed. This, however, is by no means a satisfactory explanation of the nature of this disease. It is difficult to know how we are to proceed in the cure of a disease with which we are so little acquainted. It is certainly useful to keep the bowels open, and to promote a gentle but continued perspiration. For this purpose antimonials and the saline draught will be efficacious; and when the pain is excessive opium should be given; if the fever be considerable, abstinence from animal food will be necessary. As to the limb itself, nothing gives more ease than laying it in a soft poultice, which will also have the good effect of keeping up a gentle perspiration. It forms the softest pillow that can be imagined, and never fails to bring relief.

*Treatment of Infants.*—This constitutes an extensive branch of the practice of the obstetric practitioner in modern times; especially the treatment of infants during the diseases common to the period of lactation.

It is not necessary for us, however, to enter into any detail upon this subject, important as it is in itself, having already noticed at some length both the treatment proper for infants from the moment of birth, and the diseases to which this period of life is subject, under the articles INFANCY and MEDICINE, parts III. and IV. *Nosology* and *Practice:* and to these we refer the reader.

END OF THE SEVENTH VOLUME.

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